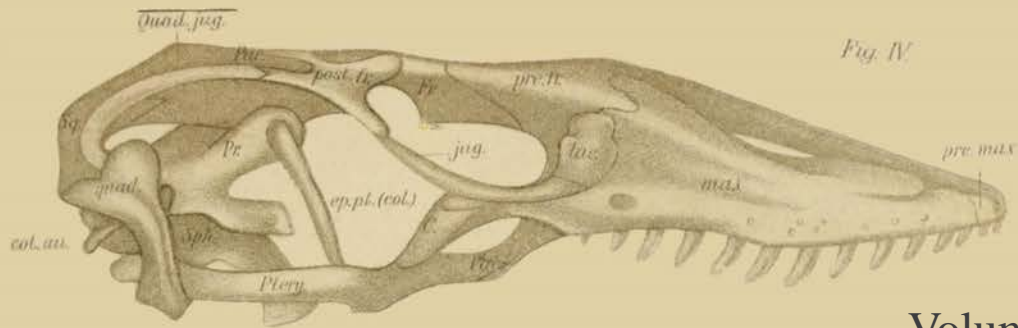
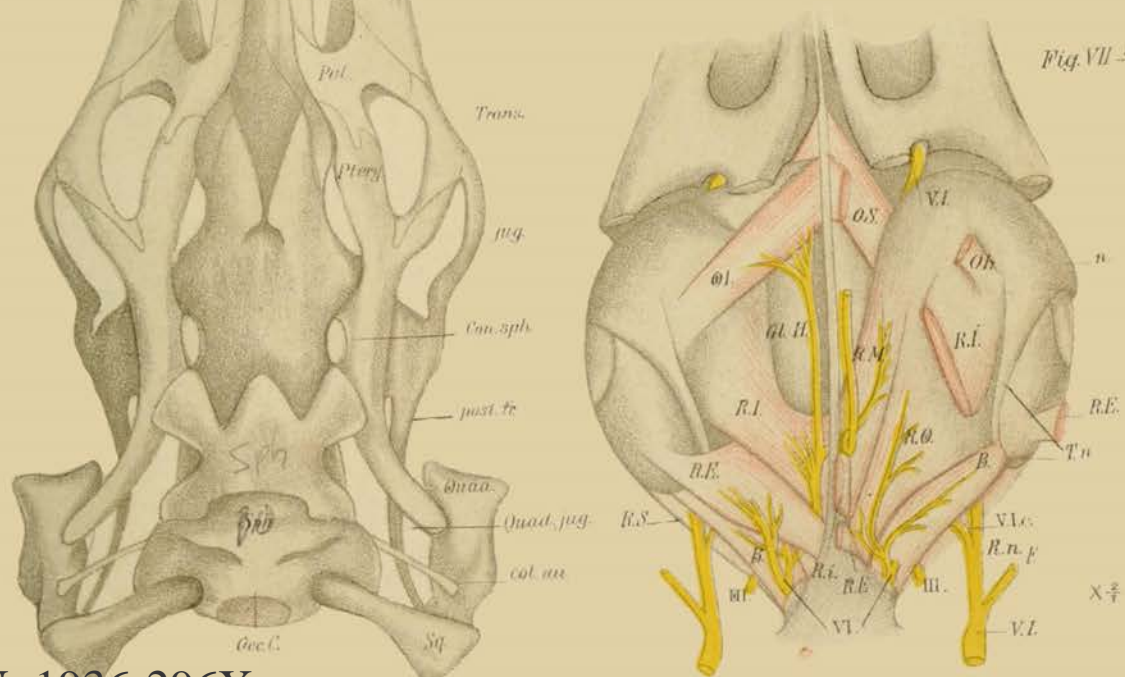
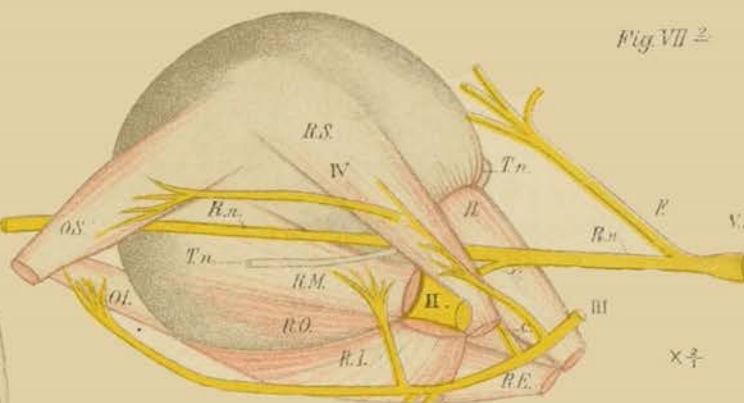
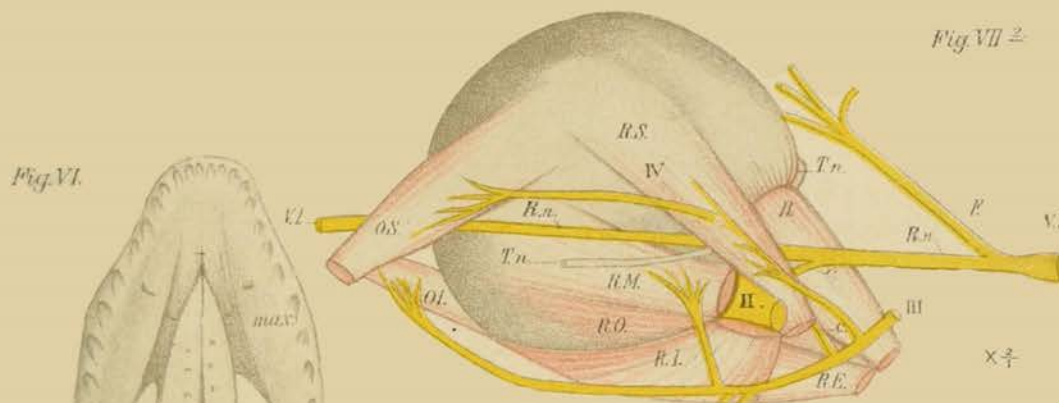
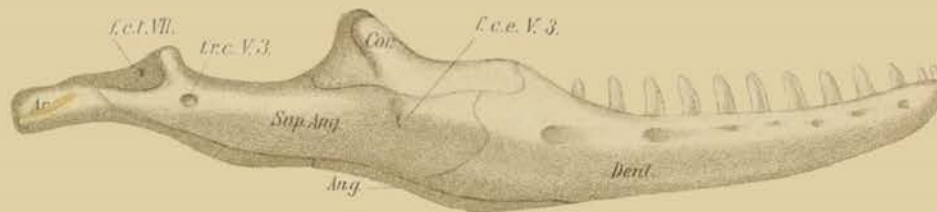


# BIAWAK

Journal of Varanid Biology and Husbandry



Volume 10 Number 2

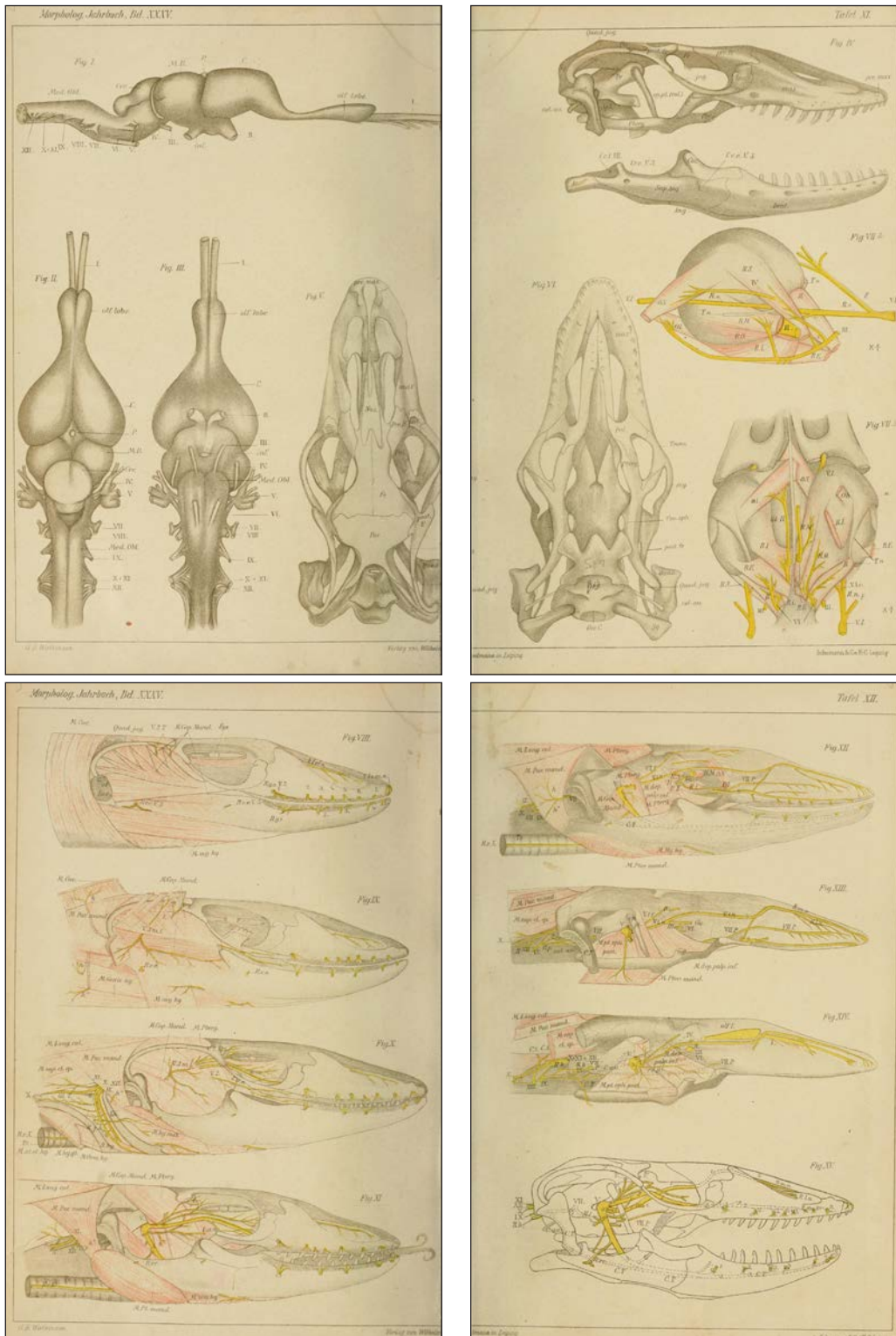


ISSN: 1936-296X

# On the Cover: *Varanus salvator bivittatus*

The hand-drawn anatomical illustrations appearing on the cover and inset of this issue originate from Grace B. Watkinson's 1906 work entitled "*The cranial nerves of Varanus bivittatus*." With 17 figures, this monograph represents one of the earliest investigations on the nervous system of varanid lizards, and features what may be the first published illustration of the varanid brain (*Varanus salvator bivittatus*). Figures courtesy of the **American Museum of Natural History Library**.

Watkinson, G.B. 1906. The cranial nerves of *Varanus bivittatus*. Gegenbaurs Morphologisches Jahrbuch 35: 450-472 + 17 figures.



---

# BIAWAK

*Journal of Varanid Biology and Husbandry*

## **Editor**

ROBERT W. MENDYK  
*Department of Herpetology  
Smithsonian National Zoological Park  
3001 Connecticut Avenue NW  
Washington, DC 20008, US  
MendykR@si.edu*

*Department of Herpetology  
Jacksonville Zoo and Gardens  
370 Zoo Parkway  
Jacksonville, FL 32218  
MendykR@jacksonvillezoo.org*

## **Associate Editors**

DANIEL BENNETT  
*PO Box 42793  
Larnaca 6503, CY  
mampam@mampam.com*

MICHAEL COTA  
*Natural History Museum  
National Science Museum, Thailand  
Technopolis, Khlong 5, Khlong Luang  
Pathum Thani 12120, TH  
herpetologe@gmail.com*

*Institute for Research and Development  
Suan Sunandha Rajabhat University  
1 U-thong Nok Road  
Dusit, Bangkok 10300, TH*

ANDRÉ KOCH  
*State Natural History Museum  
Gaußstr. 22  
D-38106 Brunswick, DE  
andrepascalkoch@web.de*

## **Editorial Liaisons**

JOHN ADRAGNA  
*john@cybersalvator.com*

MATTHEW SOMMA  
*matt\_varanid28@yahoo.com*

## **Editorial Review**

MICHAEL J. BALSAI  
*Department of Biology, Temple University  
Philadelphia, PA 19122, US  
Vze3vhpv@verizon.net*

BERND EIDENMÜLLER  
*Griesheimer Ufer 53  
65933 Frankfurt, DE  
bernd.eidenmueller@t-online.de*

MICHAEL FOST  
*Department of Math and Statistics  
Georgia State University  
Atlanta, GA 30303, US  
MFost1@student.gsu.edu*

RUSTON W. HARTDEGEN  
*Department of Herpetology, Dallas Zoo  
650 South R.L. Thornton Freeway  
Dallas, Texas 75203, US  
Ruston.Hartdegen@DallasZoo.com*

HANS-GEORG HORN  
*Monitor Lizards Research Station  
Hasslinghauser Str. 51  
D-45549 Sprockhövel, DE  
Hans-Georg.Horn@rub.de*

TIM JESSOP  
*Department of Zoology  
University of Melbourne  
Parkville, Victoria 3010, AU  
tjessop@unimelb.edu.au*

JEFFREY M. LEMM  
*Behavioral Ecology Division  
San Diego Zoo Institute for Conservation Research  
Zoological Society of San Diego  
15600 San Pasqual Valley Rd  
Escondido, CA 92027, US  
jlemm@sandiegozoo.org*

---

**INTERNATIONAL VARANID INTEREST GROUP**  
**[www.varanidae.org](http://www.varanidae.org)**

The International Varanid Interest Group is a volunteer-based organization established to advance varanid research, conservation, and husbandry, and to promote scientific literacy among varanid enthusiasts. Membership to the IVIG is free, and open to anyone with an interest in monitor lizards and the advancement of varanid research. Membership includes subscription to *Biawak*, an international research journal of varanid biology and husbandry, and is available online through the IVIG website.



News Notes.....	41
Forensic Significance of Monitor Lizard Scavenging Activity on Human Corpses .....SAMEERA A. GUNAWARDENA	45
Feeding Behavior of an Asian Water Monitor <i>Varanus salvator macromaculatus</i> on a Bornean Bearded Pig <i>Sus barbatus barbatus</i> Carcass .....JAMES FITZIMONS & JANELLE THOMAS	48
Remarks on a Case of Deformities in a Female <i>Varanus pilbarensis</i> .....ALVARO CAMINA VEGA & EDGAR WEFER	51
An Annotated Bibliography of Captive Reproduction in Monitor Lizards (Varanidae: <i>Varanus</i> ). Part I. <i>Odatria</i> .....ROBERT W. MENDYK	54
Recent Publications.....	72

---

© 2016 International Varanid Interest Group



*Varanus albigularis*. Damaraland, Namibia. Photographed by **David Kirshner**.

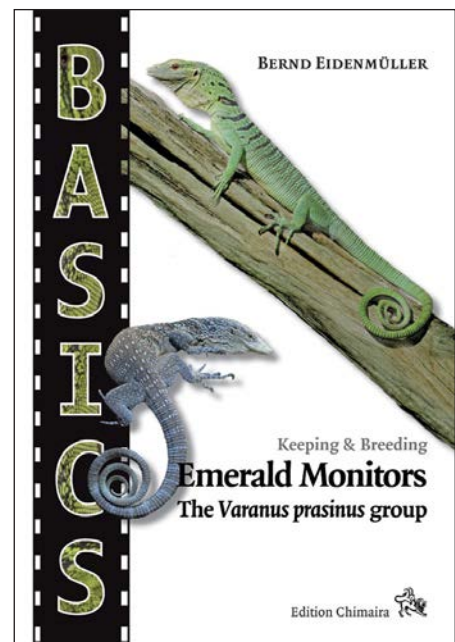
---

# NEWS NOTES

## New Book on the *Varanus prasinus* Complex

Continuing his long tradition and dedication to advancing monitor lizard husbandry, Bernd Eidenmüller has authored a new book on monitors, this time focusing on the keeping and breeding of members of the *Varanus prasinus* complex. Entitled “*Keeping & Breeding Emerald Monitors: The Varanus prasinus Group*”, and published by Edition Chimaira, this 94 page book is now available in both English and German languages. A thorough review of this book will appear in a future issue of this journal.

For additional information, see [www.chimaira.de](http://www.chimaira.de)



---

## Rosenberg's Monitors Caught on Camera near Canberra

A breeding pair of rare Rosenberg's monitors (*Varanus rosenbergi*) has been photographed near the city center of Canberra. The sighting includes documentation of egg laying in a termite mound. Amateur photographer Matthew Higgins staked out the pair and later identified what he claimed to be at least 14 hatchlings, counted on the basis of distinguishing facial marks. It was noted that the major factor in the decline of this species is predation and nest destruction from feral animals. The species is being considered for introduction to Mulligan's Flat Woodland Sanctuary which is free of feral species.

Source: [www.abc.net.au](http://www.abc.net.au); 4 November 2016

## Sightings of Nile Monitors on the Rise in Cape Coral

Sightings of the invasive Nile monitor (*Varanus niloticus*) have been increasing in the Cape Coral area

of southwestern Florida. More than thirty reports of the species have been received by authorities this year (though specific numbers for previous years were not provided) with seven in October alone. The city has begun placing traps for the animals and has reiterated its warning that, if seen, they should not be approached.

Source: [www.nbc-2.com](http://www.nbc-2.com); 16 November 2016

## Butaan Now on Exhibit at San Diego Zoo

A Butaan (*Varanus olivaceus*) is now on public display at the San Diego Zoo. The young animal was hatched at the Los Angeles Zoo the previous year from parents that had been illegally imported and confiscated by the United States Fish & Wildlife Service. The San Diego Zoo is one of only a few accredited zoos in the USA to maintain this species, and one of the only facilities to receive captive-bred offspring from the Los Angeles Zoo.

Source: [www.zoonooz.sandiegozoo.org](http://www.zoonooz.sandiegozoo.org); 26 July 2016



## Oldest Captive Komodo Dragon Dies at Calgary Zoo

Loka, a 30 year-old female Komodo dragon (*Varanus komodoensis*) and the oldest dragon kept in captivity, has died at the Calgary Zoo, having been moved there from Toronto Zoo two years earlier. She had been under care as a geriatric animal for some time with her health deteriorating over the past two weeks. She was considerably older than the now-oldest dragon, an unnamed specimen from an unnamed facility, at twenty-two years of age.

Source: [www.upi.com](http://www.upi.com); 27 July 2016

She suffered from egg-yolk coelomitis, a condition that necessitated the removal of her reproductive tract earlier this year (see news notes, Biawak Vol. 10 No. 1). Her condition declined following the procedure and the decision was made to euthanize her. She arrived at the facility in 2012 as a genetic match for a male, Teman, originally from Denver Zoo.

Source: [www.pilotonline.com](http://www.pilotonline.com); 19 July 2016

## Unexpected Reproduction of Komodo Dragons at Virginia Aquarium

### Komodo Dragon Euthanized

Jude, a nine-year old female Komodo dragon (*Varanus komodoensis*) on loan to the Virginia Aquarium & Marine Science Center from the San Antonio Zoo, was euthanized following complications from surgery.

Two Komodo dragons (*Varanus komodoensis*) have hatched at the Virginia Aquarium & Science Center from a previously undiscovered nest. They had been laid by Jude, the facility's female who had her reproductive tract removed earlier this year due to complication and later died during recovery from surgery. Prior to the female's health issues, she apparently nested a clutch on exhibit that contained eighteen eggs which escaped the notice



*Varanus bitatawa*. Northern Sierra Madre NP, Luzon, Philippines. Photographed by **Stephanie Law**.

of both aquarium staff and cameras set to monitor her activities. Two live hatchlings were later found in the adult's exhibit, and are now being cared for off display. None of the other eggs are expected to hatch. Jude, who originated from the San Antonio Zoo, had been matched with a male named Teman on loan from Denver Zoo. The pair had produced other clutches of eggs though none proved viable. No future plans for the hatchlings were announced.

Source: [www.pilotonline.com](http://www.pilotonline.com); 19 August 2016

## Officials Remove Water Monitors from Bangkok's Lumpini Park

In an effort to reduce the number of Asian water monitors (*Varanus salvator*) living in the famed Lumpini Park of inner Bangkok, Wildlife Conservation Office officials with the Department of National Parks launched efforts to capture up to 40 *V. salvator* from the park in September. The lizards, which occur in large numbers in the urban park that is frequently visited and utilized by locals and tourists, have been deemed a nuisance, and captured individuals are slated to be transferred to a wildlife breeding facility in Ratchaburi. Critics of the effort argue that the level of care given at this facility is not adequate for the species.

Source: [www.news.trust.org](http://www.news.trust.org) ; 20 September 2016

## Arrests Made over Viral Video of Monitor Killing

Forest Department officials in Chennai, Tamil Nadu, India, recently arrested two men identified from a viral video posted online which depicted people drinking blood collected from the slit throat of a live Bengal monitor (*Varanus bengalensis*). The men, who were selling the lizard's meat and blood, were arrested on various violations of the Wildlife Protection Act, which under Schedule II protects *V. bengalensis* from being hunted. Despite such protections, the species is regularly killed for its meat, blood and oil, as it is claimed to have

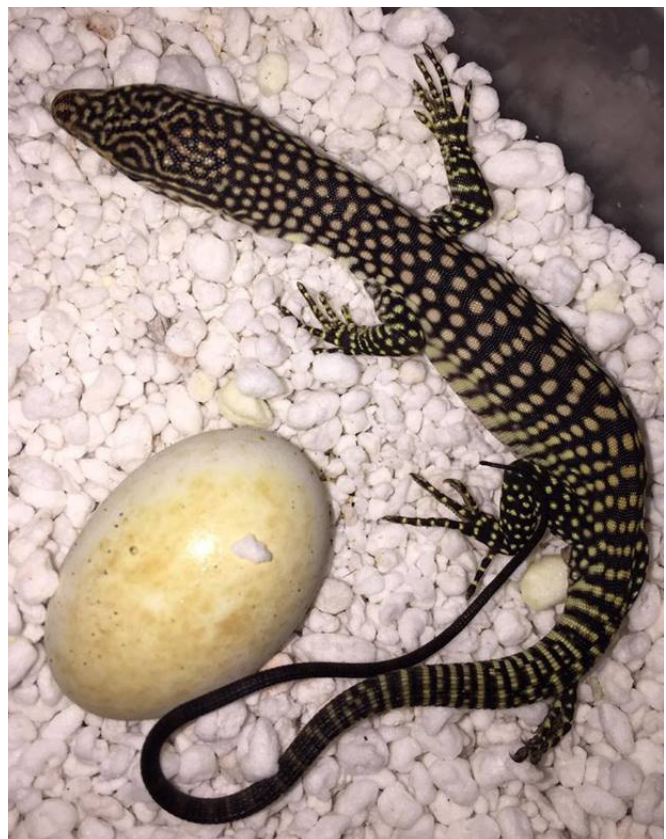
aphrodisiac properties and the ability to cure various ailments.

Source: [www.dnaindia.com](http://www.dnaindia.com) ; 28 October 2016

## Komodo Dragon Treated for Reproductive Complications

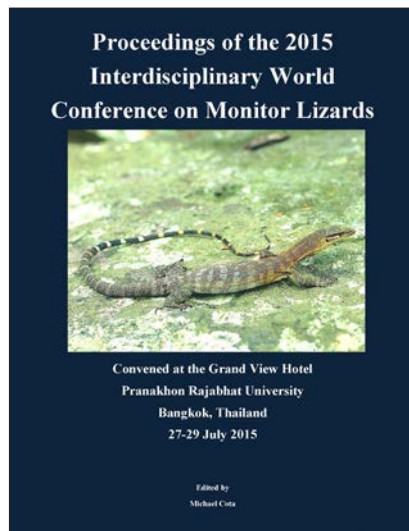
A six-year-old female Komodo dragon (*Varanus komodoensis*) at the Denver Zoo (USA) was treated for dystocia and egg yolk peritonitis after several eggs it had retained ruptured within its reproductive tract. At first, zoo staff noticed abdominal swelling and weight loss even though the dragon's appetite had increased. Ultrasonography and endoscopy revealed the presence of blood within the abdominal cavity along with eggs. The dragon was operated on the following day to retrieve the eggs and potential sources for infection, with the veterinarians performing an ovariectomy to prevent future complications. It is reported to be recovering well from the surgery.

Source: [www.livescience.com](http://www.livescience.com) ; 29 June 2016



*Varanus tristis orientalis* hatchling. Photographed by Scott Andrew.





## Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards

Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards will be available after 28 December 2016. The price will be \$35.00 USD plus shipping from Thailand. There are only a limited number of copies that will be available.

Please contact **Michael Cota** at [Herpetologe@gmail.com](mailto:Herpetologe@gmail.com) to order and for further information.



Female *Varanus exanthematicus* in Dawa, Ghana on 1 December 2016 displaying possible scent-marking behavior. This individual was observed copulating with a male two days later. Camera trap photographs by **Daniel Bennett** and **Baturi Ali**.



---

# ARTICLES

Biawak, 10(2), pp. 45-47

© 2016 by International Varanid Interest Group

## Forensic Significance of Monitor Lizard Scavenging Activity on Human Corpses

SAMEERA ANURUDDHA GUNAWARDENA

*Department of Forensic Medicine and Toxicology*

*Faculty of Medicine*

*University of Colombo*

*Kynsey Road, Colombo 8, Sri Lanka*

*E-mail: sameera@fortox.cmb.ac.lk*

**Abstract - In Sri Lanka, monitor lizards, especially the water monitor (*Varanus salvator*), locally referred to as the ‘kabaragoya’, are known to be a common scavenger on human corpses. Possibly during the process of gripping the corpse during scavenging, the sharp claws of the monitor lizard cause linear wounds on the skin which mimic incised wounds from sharp weapons. This is a unique phenomenon particularly seen in putrefied or macerated bodies which have been lying in aquatic environments. In this regard, scavenging activity by monitor lizards on human bodies has a significant impact in forensic practice since these artefactual incised injuries can mislead forensic investigators in their interpretation of the cause and circumstances of death. Further study and observations on the scavenging activity of monitor lizards, especially on large animal carcasses, will be useful for forensic investigators to better understand this phenomenon.**

The scavenging behavior of animals on human corpses has an interesting association with forensic practice. There are many reports of animals feeding on dead bodies and causing artefactual postmortem injuries which can mislead investigators in their interpretation of the cause and circumstances of death (Byard *et al.*, 2002; Byard, 2011). In Sri Lanka, the water monitor, *Varanus salvator* is known for feeding on human corpses, especially when situated in or around water.

In a recent publication by Gunawardena (2016), four cases were presented where monitor lizard scavenging activity created postmortem injuries to the body which mimicked cut wounds from sharp weapons (Figs. 1 & 2). The author believes these injuries are caused by the sharp claws of *V. salvator* (Fig. 3), as it grips the carcass during feeding (Stanner, 2010) or when crawling over the body. Most often, bodies scavenged by monitor lizards are found in a state of advanced putrefaction and

in aquatic locations such as canals or rivers. However, the author has noted one instance of monitor lizard scavenging on a dead body lying upstairs inside a house. It is possible that the softening of the skin after putrefaction or immersion in water facilitates the tearing effect from the sharp pointed claws.

Unlike other large animal scavengers in Sri Lanka such as jackals, foxes or crocodiles, *V. salvator*, or ‘kabaragoya’ as it is locally known, has adapted to living close to human-populated areas just as it has in other Southeast Asian cities, towns and villages (*e.g.*, Bennett *et al.*, 2010; Uyeda, 2009). The species is also known to have a strong sense of smell that enables it to locate carrion with ease (Traeholt, 1994). *Varanus salvator* shows both daytime and occasional nocturnal scavenging activity (De Lisle, 2007; Uyeda *et al.*, 2013) and has a wide home range (Wickramasinghe *et al.*, 2010). For these reasons, *V. salvator* is perhaps the most

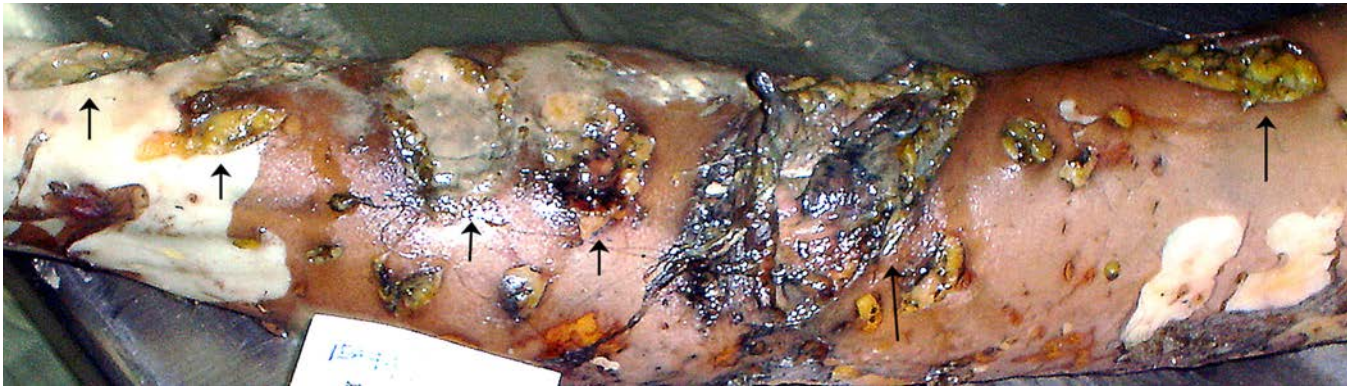


Fig. 1. Apparent cut injuries on the arm of a female body recovered from a canal (black arrows). These resemble injuries caused when defending a blow from a sharp weapon, and are referred to in forensic practice as 'defense injuries'.



Fig. 2. Postmortem cuts and stab wounds (red arrows) caused by the claws of *Varanus salvator*.

common, and often the first vertebrate scavenger to arrive to feed on human corpses in Sri Lanka.

Monitor lizards exhibit a high degree of species diversity, with many new species and subspecies described in recent years (Koch *et al.*, 2010). It is unclear whether the occurrence of these artefactual injuries is exclusive to *V. salvator*, as this phenomenon has not been reported on before. Losos & Greene (1988) quoted Stirling's observation of an Australian monitor lizard, *V. giganteus* feeding on an immature kangaroo which reads "... then placing its forefeet on the body, it tore out its flesh like a dog." It is clear how this manner of feeding can result in the claw marks mentioned above and it is possible that any large species of monitor lizard feeding on a human corpse could cause these types of injuries. The only other species of monitor lizard in Sri Lanka, the 'thalagoya' (*V. bengalensis*) is believed

to feed predominantly on much smaller prey such as insects, other invertebrates, and small mammals, but larger individuals have shown carrion seeking behavior (Losos & Greene, 1988; Pianka, 2004) and perhaps may also opportunistically feed on human corpses.

Controversies have arisen in the past, such as in the famous Azaria Chamberlain ("Dingo baby") case, where injuries caused by animals have resulted in erroneous murder convictions. In one case documented by Gunawardena (2016), the dead body of a frequent alcohol consumer was found near a riverbank and two persons were arrested on suspicion of homicide because there had been apparent cut injuries to his face. The autopsy revealed that he had died of natural causes and that the facial injuries were attributed to claw marks from a *V. salvator*. From a forensic perspective, further collaborative research on animal scavenging artefacts





Fig. 3. The sharp, pointed claws of *V. salvator* can cause injuries during scavenging as it grips the body.

can minimize such pitfalls during death investigations. Since experimental studies are limited by modern ethical regulations, the author would like to invite researchers who study these species in their natural habitat, to share their comments and observations on such artefactual injuries caused by the monitor lizards when feeding on animal carrion.

## References

Bennett, D., M. Gaulke, E.R. Pianka, R. Somaweera & S.S. Sweet. 2010. *Varanus salvator*. The IUCN Red List of Threatened Species 2010: e.T178214A7499172. <http://dx.doi.org/10.2305/IUCN.UK.2010-4.RLTS.T178214A7499172.en>. Last accessed 12 June 2016.

- Byard, R.W., R.A. James & J.D. Gilbert. 2002. Diagnostic problems associated with cadaveric trauma from animal activity. *American Journal of Forensic Medicine and Pathology* 23(3): 238-244.
- Byard, R.W. 2011. Animals, autopsies and artefacts. *Forensic Science, Medicine, and Pathology* 7(4): 309-310.
- De Lisle, H.F. 2007. Observations on *Varanus s. salvator* in North Sulawesi. *Biawak* 1(2): 59-66.
- Gunawardena, S.A. 2016. Artefactual incised wounds due to postmortem predation by the Sri Lankan water monitor (kabaragoya). *Forensic Science, Medicine, and Pathology* 12(3): 324-330.
- Koch, A., M. Auliya & T. Ziegler. 2010. Updated checklist of the living monitor lizards of the world (Squamata: Varanidae). *Bonn Zoological Bulletin* 57(2): 127-136.
- Losos, J.B., & Greene, H. W. 1988. Ecological and evolutionary implications of diet in monitor lizards. *Biological Journal of the Linnean Society* 35(4): 379-407.
- Pianka E. R. 2004. *Varanus bengalensis*. Pp. 157-160. In: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington, Indiana
- Stanner, M., 2010. Mammal-like feeding behavior of *Varanus salvator* and its conservational implications. *Biawak* 4(4): 128-131.
- Træholt, C. 1994. Notes on the water monitor *Varanus salvator* as scavenger. *Malayan Nature Journal* 47: 345-353.
- Uyeda, L. 2009. Garbage appeal: Relative abundance of water monitor lizards (*Varanus salvator*) correlates with presence of human food leftovers on Tinjil Island, Indonesia. *Biawak* 3(1): 9-17.
- Uyeda, L., E. Iskandar, A. Wirsing & R. Kyes. 2013. Nocturnal activity of *Varanus salvator* on Tinjil Island, Indonesia. *Biawak* 7(1): 25-30.
- Wickramasinghe, L.J.M., L.D.C.B. Kekulandala, P.I.K. Peabotuwage & D.M.S.S. Karunarathna. 2010. A remarkable feeding behavior and a new distribution record of *Varanus salvator salvator* (Laurenti, 1768) in eastern Sri Lanka. *Biawak* 4(3): 93-98.

# Feeding Behavior of an Asian Water Monitor *Varanus salvator macromaculatus* on a Bornean Bearded Pig *Sus barbatus barbatus* Carcass

JAMES FITZSIMONS<sup>1,2</sup> & JANELLE THOMAS<sup>3</sup>

<sup>1</sup>*The Nature Conservancy  
Suite 2-01, 60 Leicester Street  
Carlton, Victoria 3053, AU  
E-mail: jfitzsimons@tnc.org*

<sup>2</sup>*School of Life and Environmental Sciences  
Deakin University  
221 Burwood Highway  
Burwood, Victoria 3125, AU*

<sup>3</sup>*BirdLife Australia  
Suite 2-05, 60 Leicester Street  
Carlton, Victoria 3053, AU  
E-mail: janelle.thomas@birdlife.org.au*

**Abstract** – The Southeast Asian water monitor *Varanus salvator* is considered to be a generalist carnivore. Here, we describe an observation of a *V. s. macromaculatus* feeding on a dead adult Bornean bearded pig *Sus barbatus barbatus* in Borneo, and review other cases of *V. salvator* feeding on *Sus* species elsewhere in southeast Asia.

## Introduction

The Southeast Asian water monitor *Varanus salvator* is considered to be a generalist carnivore. Its diet includes large invertebrates and small vertebrates such as insects, fish, crabs, freshwater turtles, sea turtles, lizards, crocodiles and their eggs, birds and their eggs, and rats, in addition to carrion (Das, 2010; Gaulke, 1991, 1992; Gaulke & Horn, 2004; Shine *et al.*, 1998; Traeholt, 1994a,b). Opinions on the relative importance of carrion vary between authors. Although documented species-specific data on its diet and feeding techniques are scarce (Bundhitwongrut *et al.* 2008), it is increasingly reported (*e.g.*, Bundhitwongrut *et al.*, 2008; Cota & Sommerlad, 2013; Karunarathna *et al.*, 2008; Losos & Greene, 1988; Stanner, 2010).

## Observations

At 1628 h on 9 October 2015, we observed a *V. salvator macromaculatus* feeding on a dead adult Bornean bearded pig *Sus barbatus barbatus* on the muddy banks of the Kinabatangan River, near Sukau, Sabah, Borneo (5° 32' N; 118° 17' E) (Figs. 1 & 2). The pig showed no obvious signs of decomposition or injury, was largely intact, and the cause of death was not obvious. A saltwater crocodile *Crocodylus porosus* was also watching the feeding event from the water, approximately 10 m from the bank. During the 10 minutes of observation, the water monitor fed on the pig's soft internal tissues which were obtained by the monitor's head entering a cavity in the pig's abdomen (Fig. 2). The monitor was cautious throughout the feeding event. On returning to the site approximately 50





Fig. 1. *Varanus salvator macromaculatus* with dead Bornean bearded pig. Photographed by **James Fitzsimons**.



Fig. 2. Head of *V. salvator macromaculatus* entering a cavity in the Bornean bearded pig to obtain soft organs. Photographed by **James Fitzsimons**.

minutes later, the monitor was still feeding on the pig carcass in the same manner (for a further 10 minutes of observation) and the crocodile was still watching from the water.

## Discussion

Besides considerable human hunting pressure, few predators of *S. b. barbatus* are recorded (Meijaard *et al.*, 2011), although clouded leopards and reticulated pythons have been known to take piglets (Curran, in Meijaard, 2000; Phillipps & Phillipps, 2016). Our observation appears to be the first of a *V. salvator macromaculatus* feeding on a dead *S. b. barbatus*. However, in North Sumatra, Boogaarts (1938, in Meijaard, 2016), recorded Asian water monitors feeding on dead banded pigs *S. scrofa vittatus*: “We found three specimens which had been taken by tigers, and from which these had only removed the most desirable bits of meat. Monitor lizards and bears had removed the remainder of the carcasses”. In the Philippines, Gaulke (1992) reported water monitors in feeding aggregation on two ‘*Sus barbatus*’ carcasses on Calauit Island, Palawan Province. However, recent taxonomic treatment recognizes this pig taxon as a separate species, the Palawan bearded pig *S. ahoenobarbus*. Nonetheless, Gaulke (1992) suggests the ability of water monitors to detect large carcasses (such as pigs) in places like the Philippines to be low considering such potential prey are widely exploited by humans, but where detected, have an occasional

importance as a food source with high nutritional value and low energy cost when compared to hunting.

Like the observations of Boogaarts (1938) and Gaulke (1992), our observations in Sabah of a *V. salvator macromaculatus* feeding on the carcass of a *S. b. barbatus* were almost certainly a case of carrion consumption.

**Acknowledgments** – We thank two anonymous reviewers for comments on the manuscript.

## References

- Boogaarts, M. 1938. Nangoeih's. De Nederlandsch Indische Jager 1 Dec 1938: 305, 308.
- Bundhitwongrut, T., S. Saguensab, K. Thirakhupt & O.S.G. Pauwels. 2008. A case of predation of the water monitor *Varanus salvator* on the western snail-eating turtle *Malayemys macrocephala* (Reptilia: Varanidae & Bataguridae) in Bangkok. Biawak 2: 106-108
- Cota, M. & R. Sommerlad. 2013. Notes and observations on the fish prey of *Varanus salvator macromaculatus* (Reptilia: Squamata: Varanidae) in Thailand with a review of the fish prey of the *Varanus salvator* complex known to date. Biawak 7: 63-70.
- Das, I. 2010. A Field Guide to the Reptiles of South-East Asia: Myanmar, Thailand, Laos, Cambodia, Vietnam, Peninsular Malaysia, Singapore, Sumatra,

- Borneo, Java, Bali. New Holland, London, 376 pp.
- Gaulke, M. 1991. On the diet of the water monitor, *Varanus salvator*, in the Philippines. Pp. 143-153. *In*: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research*. Mertensiella 2. Deutsche Gesellschaft für Herpetologie und Terrarienkunde, e.V., Bonn.
- Gaulke, M. 1992. Taxonomy and biology of Philippine water monitors (*Varanus salvator*). *Philippine Journal of Science* 121: 345-381.
- Gaulke, M. & H.G. Horn. 2004. *Varanus salvator* (nominate form). Pp. 247-255. *In*: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*, Indiana University Press, Bloomington.
- Karunaratna, D.M.S.S., A.A.T. Amarasinghe & E.M.K.B. Ekanayake. 2008. Observed predation on a suckermouth catfish (*Hypostomus plecostomus*) by a water monitor (*Varanus salvator*) in Bellanwila Attidiya Sanctuary. *Biawak* 2: 37-39.
- Losos, J.B. & H.W. Greene. 1988. Ecological and evolutionary implications of diet in monitor lizards. *Biological Journal of the Linnean Society* 35: 379-407.
- Lucchini, V., E. Meijaard, C.H. Diong, C.P. Groves & E. Randi. 2005. New phylogenetic perspectives among species of South-east Asian wild pig (*Sus* sp.) based on mtDNA sequences and morphometric data. *Journal of Zoology* 266: 25-35.
- Meijaard, E. 2000. Bearded pig (*Sus barbatus*): Ecology, conservation status, and research methodology. Background document for the electronic conference on bearded pig research, and recommendations for a collaborative research programme, 24-26 May 2000, Bogor, Indonesia. WWF-Indonesia, CIFOR, and Ecosense Consultants, Bogor, Indonesia, 74 pp.
- Meijaard, E. 2016. Nangoeihs (bearded pigs). *Suiform Soundings* 14(2): 13-14.
- Meijaard, E., J.P. d'Huart & W.R.L. Oliver. 2011. Family Suidae (Pigs). Pp. 248-291. *In*: Wilson, D.E. & R.A. Mittermeier (eds), *Handbook of the Mammals of the World*. Volume 2: Hoofed Mammals, Lynx Edicions, Barcelona.
- Phillipps, Q. & K. Phillipps. 2016. Phillipps' Field Guide to the Mammals of Borneo and Their Ecology: Sabah, Sarawak, Brunei, and Kalimantan. John Beaufoy Publishing, Oxford, 400 pp.
- Shine, R., Ambariyanto, P.S. Harlow & Mumpuni. 1998. Ecological traits of commercially harvested water monitors, *Varanus salvator*, in northern Sumatra. *Wildlife Research* 25: 437-447.
- Stanner, M. 2010. Mammal-like feeding behavior of *Varanus salvator* and its conservation implications. *Biawak* 4: 128-131.
- Traeholt, C. 1994a. The food and feeding behavior of the water monitor, *Varanus salvator*, in Malaysia. *Malayan Nature Journal* 47: 331-343.
- Traeholt, C. 1994b. Notes on the water monitor *Varanus salvator* as a scavenger. *Malayan Nature Journal* 47: 345-353.



## Remarks on a Case of Deformities in a Female *Varanus pilbarensis*

ÁLVARO CAMINA VEGA<sup>1,\*</sup> & EDGAR WEFER<sup>2</sup>

<sup>1</sup>*Parque Temático de la Naturaleza Faunia  
Avenida de las Comunidades, 28 28032 Madrid, ES*

<sup>2</sup>*Vivaria servicios veterinarios. Valencia, ES*

\*E-mail: caminavega@gmail.com

**Abstract:** Deformities in a captive adult female *Varanus pilbarensis* are described, along with potential diagnoses of these conditions.

### Introduction

Health problems in captive reptiles and amphibians often stem from failed attempts to recreate in captivity the range of conditions that would naturally be encountered and utilized by species in the wild. Veterinarians often encounter medical challenges resulting from inadequate or inappropriate diets and nutrition, environmental conditions (*i.e.*, temperature, humidity), and lighting (*i.e.*, UVB exposure) as well as many other husbandry-related factors. These can often be avoided with a better understanding of the biological parameters and specific husbandry needs of a species. In the following case report, we report on severe deformities in a captive *Varanus pilbarensis* that are most likely the result of inadequate supportive husbandry. This information can be of value and interest to veterinary clinicians, herpetologists, and reptile keepers working with monitor lizards in captivity.

### Case Report

In December 2015, we were contacted by a private reptile keeper that was experiencing health problems with a captive female *V. pilbarensis* in their collection. This individual acquired the specimen from an unknown keeper; therefore, many important details about its previous husbandry, exact age, and other relevant biological information were unknown. Since it was difficult to make an accurate diagnosis about its pathology without this historical information,

it was decided to approach this unusual case using radiographic evaluation, biopsy, and cytology.

Upon its arrival in our care, the *V. pilbarensis*, which measured 36 cm in total length and 27 g, was lethargic and had difficulties moving, with significant deformities affecting its motor and nervous systems (Fig 1.). Because of this, it had problems hunting live food; therefore, it was easier for the specimen to capture prey (legless crickets and locusts) in small containers or when offered with tweezers. On several occasions warm water baths were provided, during which the monitor lizard drank greedily. It defecated only once in three weeks of maintenance and excreted large quantities of very dense urates. A few days after being introduced to its



Fig. 1. Deviation of the spine (scoliosis). Paravertebral lumps are also present.



Fig. 2. Ventral view of the left anterior limb. A dense and caseous material is noticed on the tissues.



Fig. 3. Pectoral muscles with chalky material accumulation.

new terrarium, it stopped eating altogether and refused to move.

Physically, the animal's condition was quite deteriorated. It was almost impossible for the lizard to walk on four legs, to the extent where it dragged the anterior part of its body on the ground, propelled by the hind legs. The four limbs lacked uniformity and several hard masses were detectable in the radio-ulnar, tarsal and carpal, femoral, tibial and humeral regions. The appearance of the digits was quite variable, with most showing deformities including amputations and pathological swellings (Fig. 2). In addition, there was a noticeable deformity of the spine, and the tail showed pathological deviations and a loss of muscle mass. On the ventral side of the body and in the ventral regions of

the limbs, a bulging area of an off-white solid material was observed (Fig. 3). Dorsal and paravertebral masses distributed along almost the entire spinal column from the last cervical vertebrae to the lumbar area were also observed (Fig. 4). The eyes were a bit sunken and opaque, suggesting a moderate degree of dehydration. In the mouth there were white masses attached to the mucosa of the maxillary and mandibular branches (Fig. 5), and in the pharynx at the level of the parotid region there were some lumps that protruded toward the cavity which were very dense and had a firm adherence to the soft tissue.

A differential diagnosis in this case could be gout, metastatic calcifications, primary or secondary hyperparathyroidism, metabolic bone disease,



Fig. 4. Similar material as shown in Fig. 3 in paravertebral and intercostal muscles.



Fig. 5. Calcification of the pharyngeal and oral tissues.



deposits of calcium hydroxyapatite, renal disease, or a combination of several of these pathologies. In this case, it was impossible to take a blood sample because blood vessels were probably quite collapsed and dehydration resulted in a state of hypotension in the animal. For this reason, we were unable to determine calcium and phosphorus levels in the blood and other chemical parameters to get an accurate diagnosis of renal failure. General radiography was performed to assess the state of the skeleton and the density of the material in the muscles and joints (see Figs 1 & 3). Scoliosis, a loss of bone density in some vertebrae, and fractures in the left tibia and some phalanges were revealed. Pathological tissue densities at various points of the joints and muscle areas of the limbs were also detected.

Despite making all efforts to save the life of this animal with supportive care, it died three weeks after its arrival. Several tissue samples were taken for histopathological analysis, which revealed metastatic calcification of the kidneys, heart and large blood vessels, and other organs. At postmortem examination, the articular and periarticular tissues of the limbs and dorsal muscles contained well-demarcated accumulations of a soft, white, and pasty to chalky material. The absence of uric acid crystals and tophi in tissues suggests that this case is not related to gout, which can be common in captive monitor lizards (Garner, 2008; Hartdegen, 2002;

Köhler, 1992; Mendyk *et al.*, 2013). It is presumed that excessive dietary calcium supplementation, chronic dehydration and possibly the excessive use of vitamin D3 supplements were the main cause for death in this specimen.

**Acknowledgments** – We would like to thank André Koch, Lino Pérez de Quadros, Gabriel Alcántara, Verónica Márquez, Jairo Cuevas and Ignacio García-Delgado Flores.

## References

- Garner, M.M. 2008. A retrospective study of disease in monitor lizards (*Varanus* spp.). Proceedings of the Association of Reptile and Amphibian Veterinarians 2008: 1-2.
- Hartdegen, R.W. 2002. 2002 Asian Forest Monitor North American Regional Studbook. Third Edition. Dallas Zoo, Dallas. 123. pp.
- Köhler, G. 1992. Häufige Todesursachen bei Waranen und Krustenechsen. Monitor 1: 28–41.
- Mendyk, R.W., M. Baumer & A.L. Newton. 2013. A retrospective study of mortality in varanid lizards (Reptilia: Squamata: Varanidae) at the Bronx Zoo: Implications for husbandry and reproductive management in zoos. Zoo Biology 32: 152-162.

## **An Annotated Bibliography of Captive Reproduction in Monitor Lizards (Varanidae: *Varanus*). Part I. *Odatria***

ROBERT W. MENDYK<sup>1,2</sup>

<sup>1</sup>*Department of Herpetology  
Jacksonville Zoo and Gardens  
370 Zoo Parkway  
Jacksonville, FL 32218, USA*

<sup>2</sup>*Department of Herpetology  
Smithsonian National Zoological Park  
30001 Connecticut Avenue  
Washington, D.C. 20008, USA*

*E-mail:* mendykr@jacksonvillezoo.org

**Abstract:** Popular in zoos and private collections, monitor lizards have been maintained in captivity for nearly two centuries. During this time, but especially over the past three decades, a voluminous body of publications has brought to light important details and perspectives that have helped advance their captive husbandry and reproductive management. This bibliography presents an annotated compilation of publications pertaining strictly to the captive reproduction of monitor lizards belonging to the *Varanus* subgenus *Odatria*. It is intended to serve as a guide for zoos and private herpetoculturists looking to expand their knowledge and familiarity with this group and introduce readers to different perspectives on their management and reproduction in captivity.

### **Introduction**

Monitor lizards have a long and fascinating history of being maintained in captivity that dates back to at least the early 19th Century. Some of the earliest published accounts of monitor lizards in captive collections reference animals held in European menageries and zoological gardens (Cox, 1831; Knight, 1867; Mitchell, 1852; Sclater, 1877), although private keepers also maintained representatives of this group during this period (Bateman, 1897; Lachman, 1899; von Fischer, 1884). Alfred “Gogga” Brown was probably the first individual to genuinely attempt to reproduce monitor lizards in captivity in the late 1800s (Branch, 1991). Although he received hundreds of eggs (from 33 clutches) from a large group of more than 40 captive *Varanus albigularis* he maintained outdoors in South Africa, he was unsuccessful in hatching any live offspring, Brown (Branch, 1991). Eggs had also been

received but not hatched by other keepers during the around this time (*e.g.*, Thilenius, 1898); these eggs were usually scattered by the females who clearly did not have appropriate conditions available for nesting (Branch, 1992; Thilenius, 1898). A poor understanding of monitor lizard biology and husbandry and reptile egg incubation undoubtedly prohibited successful captive breeding from taking place for many decades. This was especially apparent in a 1967 report by Osman (1967), who while discussing a clutch of *V. komodoensis* eggs that scattered across the ground of its enclosure rather than buried, suspected that the eggs were to be later buried in the sand by the female after they had been left out in the sun for the shells to harden.

The first documented record of successful captive breeding of a monitor lizard occurred with *V. komodoensis* in 1941 (de Jong, 1944). Unknown to their caretakers, a pair of adults maintained at the Batavia Zoo since 1938 secretly nested a clutch of eggs in their exhibit which



unexpectedly hatched several months later, much to the zoo's surprise. The next documented case of successful captive reproduction in monitor lizards did not occur until 1962, when a wild-caught gravid *V. albigularis* produced a clutch of eggs shortly after arriving at the San Diego Zoo, which resulted in a single hatchling. Several additional species were successfully bred for the first time in the 1970s (Horn, 1978; Horn & Visser, 1989), with more species hatched in the 1980s (e.g., Bredl & Horn, 1987; Bröer & Horn, 1985; Eidenmüller, 1986; Eidenmüller & Horn, 1985; Horn & Petters, 1982; Horn & Visser, 1989; Irwin, 1996; Stirnberg & Horn, 1981). From the 1990s onward, monitor lizard husbandry continued to advance rapidly, to the point where at least 53 species have now been successfully reproduced in captivity (Eidenmüller, 2007; Horn & Visser, 1997; Husband & Bonnett, 2009; Brown, 2012).

One of the most popular groups of monitor lizard maintained in zoos and private collections today is the *Varanus* subgenus *Odatia*, which includes the most diminutively-sized species of monitor lizard, ranging from ca. 23-100 cm in total length. Often referred to as "dwarf" monitors, representatives of this group have been maintained in captivity since at least the late 19th century (Saville-Kent, 1897) and successfully bred since the 1970s (Horn, 1978; Horn & Visser, 1989). Although new species continue to be described from this group (e.g., Aplin *et al.*, 2016; Doughty *et al.*, 2014; Maryan *et al.*, 2014) that may not yet represented in captive collections, most species of *Odatia* are commonly kept and bred in captivity in Australia, Europe and North America, with at least 20 reproduced to date. For some species such as *V. acanthurus*, it is likely that over 20 captive-bred generations have been produced since the 1980s.

Given the overall keeping and reproductive success of this group in captivity, numerous accounts outlining aspects of their captive care and breeding have been published over the last several decades. The following bibliography, which represents the first of what will be several installments on the captive breeding of monitor lizards, focuses chiefly on the subgenus *Odatia*. Similar works that address other subgenera are planned.

### Using this bibliography

This bibliography covers all aspects of captive reproduction including both successful and unsuccessful attempts. It is largely intended to serve as a resource for zoo professionals and private herpetoculturists working with these species in captivity, but may also

prove valuable to conservation biologists, ecologists, veterinarians and general enthusiasts seeking to familiarize themselves with existing literature on the reproductive biology of monitor lizards. Species covered in this bibliography are organized alphabetically, with annotations describing the nature and content of each work appearing inside brackets after each reference.

Due to taxonomic uncertainty in numerous publications between the closely-related *V. scalaris* and *V. similis*, references documenting these species have been combined into a single bibliographic account.

While best efforts were made to document all known publications relevant to the reproduction of these species in captivity, I recognize the possibility and likelihood that some publications may have been missed. Given that bibliographies are perpetual works in progress, I welcome and encourage feedback on publications missing from this bibliography and new accounts as they are published that can be added to an updated version of this document in the future.

**Acknowledgments** – This bibliographic series is dedicated to the late Mark K. Bayless, whose many contributions to the study of monitor lizards have helped advance the fields of monitor lizard biology and captive husbandry, inspire a new generation of enthusiasts, and stimulate new research on this group, including the present bibliography. I am indebted to Kristen Bullard, Richard Green, Michael Hardy, and Polly Lasker of the Smithsonian Institution Libraries for their assistance with sourcing obscure literature, and would also like to thank Ben Aller for allowing access to Mark Bayless's former library of monitor literature.

### References

- Aplin, K.P., A.J. Fitch & D.J. King. 2006. A new species of *Varanus* Merrem (Squaata: Varanidae) from the Pilbara region of Western Australia with observations on sexual dimorphism in closely related species. *Zootaxa* 1313: 1-38.
- Bateman, G.C. 1897. The Vivarium: Being a Practical Guide to the Construction, Arrangement, and Management of Vivaria. L. Upcott Gill, London. 424 pp.
- Branch, W.R. 1991. The Regenia Registers of 'Gogga' Brown (1869-1909) "Memoranda on a species of monitor or varan". Pp. 57-110. In: Horn, H.-G. & W. Böhme (eds.), *Advances in Monitor Research*, Mertensiella 2. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach.

- Bredl, J. & H.-G. Horn. 1987. Über die Nachzucht des australischen Riesenwarens *Varanus giganteus*. *Salamandra* 23(2/3): 90-96.
- Bröer, W. & H.-G. Horn. 1985. Erfahrungen bei der Verwendung eines Motorbruters zur Zeitung von Reptilieneiern. *Salamandra* 21(4): 304-310.
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp.
- de Jong, J.K. 1944. Newly hatched *Varanus komodoensis*. *Treubia* 18: 143-145.
- Doughty, P., L. Kealley, A. Fitch & S.C. Donnellan. 2014. A new diminutive species of *Varanus* from the Dampier Peninsula, western Kimberly region, Western Australia. *Records of the Western Australian Museum* 29(2): 128-140.
- Eidenmüller, B. 1986. Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) t. timorensis* (Gray, 1831). *Salamandra* 22(2/3): 157-161.
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp.
- Eidenmüller, B. & H.-G. Horn. 1985. Eigene Nachzuchten und der gegenwertige Stand der Nachzucht von *Varanus (Odatria) storri* Mertens, 1966. *Salamandra* 21(1): 55-61.
- Horn, H.-G. 1978. Nachzucht von *Varanus gilleni* (Reptilia: Sauria: Varanidae). *Salamandra* 14(1): 29-32.
- Horn, H.-G. & G. Petters. 1982. Beiträge zur Biologie des Rauhnackenwarans, *Varanus (Dendrovaranus) rudicollis* Gray. *Salamandra* 18(1/2): 29-40.
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. *International Zoo Yearbook* 28: 140-150.
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246.
- Husband, G. & M. Bonnett. 2009. Monitors. Pp.484-583. In: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale.
- Irwin, S. 1996. An innovative strategy for the detection of egg-deposition in captive varanid reptiles. *Herpetofauna* (Sydney) 26(1): 31-32.
- Knight, C. 1867. Monitoridae or Monitors. Pp. 879-882. In: *Natural History: Or, Second Division of The English Encyclopedia*. Volume 3. Scribner, Welford & Co., London.
- Lachmann, S. 1889. Die Bewohner meiner Terrarien. *Isis: Zeitschrift für alle Naturwissenschaftlichen Liebhabereien* 14(23): 181-182.
- Maryan, B., P.M. Oliver, A.J. Fitch & M. O'Connell. 2014. Molecular and morphological assessment of *Varanus pilbarensis* (Squamata: Varanidae), with a description of a new species from the southern Pilbara, Western Australia. *Zootaxa* 3768(2): 139-158.
- Mitchell, D.W. 1852. A Popular Guide to the Gardens of the Zoological Society of London. D.W. Mitchell, London. 62 pp.
- Osman, H. 1967. A note on the breeding behaviour of the Komodo dragons *Varanus komodoensis* at Jogjakarta Zoo. *International Zoo Yearbook* 7: 181.
- Saville-Kent, W. 1897. Lizards. Pp. 69-100. In: *The Naturalist in Australia*. Chapman & Hall, London.
- Sclater, P.L. 1877. Family: Monitoridae. Pp. 448-449. In: *List of the Vertebrated Animals Now or Lately Living in the Gardens of the Zoological Society of London*. Zoological Society of London, London.
- Staedeli, J.H. 1962. Our very own monitors. *Zoonooz* 35(7): 10-15.
- Stirnberg, G.E. & H.-G. Horn. 1981. Eine unerwartete Nachzucht im Terrarium: *Varanus (Odatria) storri*. *Salamandra* 17(1/2):55-62.
- Thilenius, G. 1898. Herpetologische Notizen aus Süd-Tunis. *Zoologische Jahrbücher* 1898(3): 219-237.
- von Fischer, J. 1884. Das Terrarium, seine Bepflanzung und Bevölkerung: ein Handbuch für Terrarienbesitzer und Tierhändler. Mahlau & Waldschmidt, Frankfurt a.M. 384 pp.



## Subgenus: *Odatria*

### *Varanus acanthurus*

- Adragna, J. & G.M. Madden. 2009. Mending a ruptured *Varanus acanthurus brachyurus* egg. *Biawak* 3(4): 144-145. [describes successful breeding, egg repair and incubation]
- Anonymous. 1986. Species of wild animals bred in captivity during 1984 and multiple generation births. *reptiles. International Zoo Yearbook* 26: 417-427. [documents zoo breeding]
- Anonymous. 1987. Species of wild animals bred in captivity during 1985 and multiple generation births. *reptiles. International Zoo Yearbook* 27: 346-351. [documents zoo breeding]
- Anonymous. 1988. Species of wild animals bred in captivity during 1986 and multiple generation births. *reptiles. International Zoo Yearbook* 28: 392-398. [documents zoo breeding]
- Anonymous. 1989. Species of wild animals bred in captivity during 1987 and multiple generation births. *reptiles. International Zoo Yearbook* 29: 250-256. [documents zoo breeding]
- Anonymous. 1990. Species of wild animals bred in captivity during 1988/1989 and multiple generation births. *Reptiles. International Zoo Yearbook* 30: 326-342. [documents breeding at Buffalo Zoo]
- Anonymous. 1992. Species of wild animals bred in captivity during 1990 and multiple generation births. *reptiles. International Zoo Yearbook* 31: 270-277. [documents zoo breeding]
- Anonymous. 1994. Reptiles bred in captivity and multiple generation births 1992. *International Zoo Yearbook* 33: 305-312. [documents zoo breeding]
- Anonymous. 1997. Secrets of the goanna man, part 1. *Vivarium* 9(2): 16-17, 65-66. [provides breeding information and data]
- Anonymous. 1997. Species of wild animals bred in captivity during 1994 and multiple generation captive birds. *Reptiles. International Zoo Yearbook* 35(1): 354-362. [documents breeding at Frankfurt Zoo]
- Anonymous. 1998. Secrets of the goanna man, part 2. *Vivarium* 9(3): 65-66. [provides breeding information]
- Anonymous. 2007. Entwicklung des Tierbestandes: Reptilien, Amphibien, Fische. *Zeitschrift des Kölner Zoo* 50(1): 14-17. [briefly mentions first breeding at Cologne zoo in 2006]
- Anonymous. 2008. Reptiles. Pp. 15-16. *In: Jahresbericht 2008 der Aktiengesellschaft Zoologischer Garten Köln, Köln.* [briefly mentions breeding at Cologne Zoo in 2008]
- Anonymous. 2009. Reptilien. *Zeitschrift des Kölner Zoo* 52(1): 15-16. [briefly documents breeding at Cologne Zoo in 2008]
- Anonymous. 2010. Jahresbericht 2007 der Aktiengesellschaft Zoologischer Garten Köln. *Wirbellose, Fische, Amphibien, Reptilien. Zeitschrift des Kölner Zoo* 53(1): 17-18. [briefly mentions breeding at Cologne Zoo]
- Anonymous. 2011. Report from the third annual meeting of the AG Warane. *Biawak* 5(1/2): 8. [briefly mentions breeding at Cologne Zoo]
- Arth, S. 2007. Keeping and breeding the spiny-tailed monitor *Varanus acanthurus*. *Reptilia (GB)* 50: 28-36. [describes successful breeding]
- Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [provides breeding information and reproductive data]
- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Burokas, J. 2008. *Varanus acanthurus acanthurus* (ridge-tailed monitor) reproduction. *Biawak* 2(1): 40-41. [describes successful breeding]
- de Ruiter, M. 1993. Erste Nachzucht des Gray-Warans. *Die Aquarien- und Terrarien Zeitschrift* 46(10): 619. [briefly mentions Dallas Zoo's breeding of *V. acanthurus brachyurus*]
- Eidenmüller, B. 1992. Einige Bemerkungen über die Zeitigungsparamater von Warangelegen. *Monitor* 1(1): 14-20. [describes successful reproduction]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 1994. Bemerkungen zur Haltung und Zucht von *Varanus acanthurus* Boulenger, 1885, *V. storri* Mertens, 1966 und *V. gilleni* Lucas & Frost, 1895. *Herpetofauna (Weinstadt)* 16(88): 6-12. [describes reproduction and documents third

- captive-bred generation produced]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. *In*: Wilkie, A.H. (ed.), Proceedings of the 1997 International Herpetological Society Symposium. International Herpetological Society. [provides breeding data]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Erdfelder, K.-H. 1984. Haltung und Zucht des Stachelschwanzwarans, *Varanus acanthurus* Boulenger, 1885. Sauria 1: 9-11. [describes successful breeding]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. International Zoo Yearbook 28: 140-150. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. International Zoo Yearbook 35: 227-246. [presents reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides reproductive data]
- Irwin, S., K. Engle & B. Mackness. 1996. Nocturnal nesting by captive varanid lizards. Herpetological Review 27(4): 192-194. [briefly mentions breeding at Australia Zoo]
- Jauch, D. 1984. Vermutlich eine Weltpremiere: Die Nachzucht des Stachelschwanzwarans. Aquarien Magazin 18(5): 236-237. [describes successful reproduction at the Wilhelma, Stuttgart]
- Krebs, U. 1999. Experimental variation of breeding season and incubation time in the spiny-tailed monitor (*Varanus acanthurus*). Pp. 227-238. *In*: Horn, H.-G. & W. Böhme (eds.), Advances in Monitor Research II, Mertensiella 11. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [describes successful breeding and incubation]
- Kuhn, P. & J. Julander. 1999. Husbandry and captive breeding of the red acanthurus monitor *Varanus acanthurus*: A giant dwarf. Vivarium 10(3): 23-26. [describes successful breeding]
- Lemm, J. 1999. Ackies: The natural history and captive husbandry of the spiny-tailed monitor (*Varanus acanthurus*). Reptiles 7(6): 48-65. [describes successful breeding]
- Lipfert, J. & A. Dickoff. 2004. Der Stachelschwanzwaran *Varanus acanthurus*. Natur und Tier Verlag GmbH, Münster. 61 pp. [describes successful breeding and provides reproductive data]
- Murphy, J.B. 1971. Notes on the care of the ridge-tailed monitor *Varanus acanthurus brachyurus* at Dallas Zoo. International Zoo Yearbook 11: 230-231. [describes nesting, failed attempts to incubate eggs]
- Murphy, J.B. 1972. Notes on some Indo-Australian varanids in captivity. International Zoo Yearbook 12: 199-202. [describes nesting in 1968 but failure to hatch eggs]
- Ramm, T. 2013. "Red Ackies" – die Haltung und Nachzucht des Roten Stachelschwanzwarans, *Varanus acanthurus*. Draco 53: 61-68. [describes successful reproduction]
- Reijden, J.v.d. 2006. Captive husbandry and breeding of the ridge-tailed monitor *Varanus acanthurus*. Reptiles Australia 3(1): 6-11. [describes successful reproduction]
- Rogner, M. 1997. Monitor Lizards. Pp. 9-37. *In*: Lizards: Volume 2. Krieger, Malabar. [provides breeding information and data]
- Spitsin, V.V. (ed.). 2009. Breeding of wild and some domestic animals at regional zoological institutions. Informational Issue of the Eurasian Regional Association of Zoos & Aquariums 28: 83, 230. (*In Russian*) [documents breeding at Kiev Zoo in 2008]
- Thissen, R. 1991. A double clutch and successful hatching of Australian spiny-tailed monitors, *Varanus acanthurus* Boulenger. Varanews 1(7): 5-6. [describes successful reproduction]
- Thissen, R. 1992. Breeding the spiny-tailed monitor *Varanus acanthurus*. Vivarium 3(5):32-34. [describes successful reproduction]
- Thissen, R. 1993. Haltung und Zucht des Stachelschwanzwarans *Varanus acanthurus* (Boulenger,1885). Elaphe 1(3): 4-9. [describes successful reproduction]
- van der Koore, J. 1988. De kweek van varanen in gevangenschap. Lacerta 47(2): 35-39. [briefly mentions successful breeding programs at Stuttgart and Frankfurt Zoos]
- van der Koore, J. 1989. Kweek met varanen van 1966-1987. Lacerta 47(4): 106-107. [briefly documents



- breeding at Wilhelma, Stuttgart from 1984-1986]
- Vincent, M. & S. Wilson. 1999. Australian Goannas. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]
- Visser, G.J. 1996. Waranhaltung und Zucht im Zoo Rotterdam/Niederlande. *Monitor* 4(2): 27-31. [documents successful breeding at Rotterdam and Frankfurt Zoos]
- Visser, G.J. 2003. Herpetology at the Rotterdam Zoo. *Herpetological Review* 34(1): 11-16. [briefly documents breeding at Rotterdam Zoo]
- Vobruba, M. 2005. A field trip to the history of monitor keeping in Zoo Plzen. Pp. 66-69. *In: Zoological and Botanical Garden Pilsen Annual Report 2005. Zoologická a Botanická Zahrada Města Plzně, Plzeň.* [brief mention of breeding in 2004]
- Vyskočil, J. 2013. *Varanus acanthurus*. *Tera Magazín* 2013(2): 36-37. [provides breeding information]
- Wick, W. 1996. Erfahrungen bei der Haltung und Zucht des Australischen Stachelschwanzwaran *Varanus (Odatia) acanthurus brachyurus*. *Monitor* 4(2): 5-18. [describes successful reproduction at Frankfurt Zoo]
- Wicker, R. 1993. Pflege und Zucht von *Varanus acanthurus*. *Monitor* 2(1):13-14. [describes successful reproduction at Frankfurt Zoo]

### *Varanus auffenbergi*

- Eidenmüller, B. 2003. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Everett, J. 2008. *Varanus auffenbergi* (peacock monitor) reproduction. *Biawak* 2(2): 101. [describes successful breeding]
- Hogston, J. 1998. Observations on the Roti Island spotted tree monitor, *Varanus timorensis* ssp., in captivity. *Notes from NOAH* 25(5): 2-6. [documents infertile eggs laid in 1997]
- Hörenberg, T. 2013. Der Timorwarane der Insel Roti: *Varanus auffenbergi*. *Draco* 53: 51-54. [describes successful breeding]
- Kirschner, A. 1999. Bemerkungen zur Pflege und Zucht vom Timorwaran der Insel Roti, Indonesien. *Herpetofauna (Weinstadt)* 21(123): 13-18. [describes successful breeding]
- Konáš, J. 2007. Cold-blooded animals. Pp. 39. *In: Zoological and Botanical Garden Pilsen Annual Report 2007. Zoologická a Botanická Zahrada Města Plzně, Plzeň.* [documents successful breeding and suspected parthenogenesis]
- Wesiak, K. 2008. Unterbringung, Pflege und Nachzucht von *Varanus (Odatia) auffenbergi* Sprackland, 1999. *Elaphe* 16(1): 37-47. [describes successful reproduction]

### *Varanus baritji*

- Bedford, G.S. & G. Husband. 2003. Captive breeding of the lemon throated monitor *Varanus baritji*. *Herpetofauna (Sydney)* 33(2): 105-108. [describes successful breeding]
- Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [briefly mentions a wild-caught female nesting, but no further details]
- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In: Swan, M. (ed.), Keeping and Breeding*

Australian Lizards. Mike Swan Herp Books, Lilydale. [provides reproductive data]  
 King, M. 2004. *Varanus baritji*. Pp. 308-311. In: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington. [provides reproductive data]

Wheaton, J. 2011. Beautiful baritjis. *Scales and Tails Australia* 16: 18-24. [provides breeding information]

### *Varanus brevicauda*

Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [provides some breeding information and reproductive data]  
 Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]  
 Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]  
 Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]  
 Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]  
 Fyfe, G. 2000. Goannas of Central Australia. *East Texas Herpetological Society Newsletter*, Aug/Sept: 6 pp. [briefly mentions breeding at two Australian facilities]  
 Fyfe, G., B. Munday & J. Comber. 1999. Captive husbandry and breeding of the short-tailed goanna, *Varanus brevicauda* at the Alice Springs Desert Park. *Herpetofauna* (Sydney) 29(2): 31-36. [describes successful breeding]  
 Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. *International Zoo Yearbook* 28: 140-150. [presents reproductive data and documents first breeding in 1973]  
 Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246. [presents reproductive data]

Husband, G. & M. Bonnett. 2009. *Monitors*. Pp. 484-583. In: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]  
 Kirschner, A., T. Müller & H. Seuffer. 1996. *Faszination Warane*. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]  
 Limberiou, L. 2006. Breeding the "Brevies". *Monitor-Journal of the Victorian Herpetological Society* 15(1): 12-14. [describes successful breeding]  
 Martin, T. 2009. Great things come in small packages... keeping and breeding short-tailed pygmy monitors. *Scales and Tails Australia* 3: 46-49. [describes successful breeding]  
 Rogner, M. 1997. *Monitor Lizards*. Pp. 9-37. In: *Lizards: Volume 2*. Krieger, Malabar. [presents reproductive data]  
 Schmida, G. E. 1974. Der kurzschwanzwaran (*Varanus brevicauda*). *Die Aquarien- und Terrarien Zeitschrift* 27(11): 390-394. [briefly mentions first breeding]  
 Schmida, G. 2005. Die australischen Warane. *Die Aquarien- und Terrarien Zeitschrift* 58(2): 6-11. [documents breeding on two occasions]  
 Standon, W. 2008. *Husbandry manual for the short tailed monitor Varanus brevicauda* (Reptilia: Varanidae). Western Sydney Institute of TAFE. 43 pp. [provides reproductive information and data]  
 Thompson, G. 1996. Breeding *Varanus brevicauda*. *Western Australia Naturalist* 21(2): 119-121. [successful hatching of eggs from wild-caught adults]  
 Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides reproductive data]

*Varanus bushi*

- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides breeding information and presents reproductive data]

*Varanus caudolineatus*

- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp.484-583. *In*: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]
- Retes, F. & D. Bennett. 2001. Multiple generations, multiple clutches, and early maturity in four species of monitor lizards (Varanidae) bred in captivity. *Herpetological Review* 32(4): 244-245. [presents reproductive data]
- Smith, L.A. 1988. Notes on a clutch of monitor (*Varanus caudolineatus*) eggs. *Western Australia Naturalist* 17(4):96. [documents eggs received from a wild-caught female; failed incubation attempt]
- Thompson, G.G. 2004. *Varanus caudolineatus*. Pp. 318-327. *In*: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington. [presents reproductive data]
- Thompson, G.G. & S.A. Thompson. 2002. Clutch of *Varanus caudolineatus* (Varanidae). *Western Australian Naturalist* 23(3): 228. [presents reproductive data for a clutch of eggs incubated in captivity]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides reproductive data]

*Varanus eremius*

- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]
- Scheelings, F. 2009. Diseases and disorders of Australian lizards. Pp. 58-71. *In*: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [describes a case of egg binding]

*Varanus gilleni*

- Anon. 1980. Species of wild animals bred in captivity during 1978 and multiple generation captive births. reptiles. *International Zoo Yearbook* 20: 378-382. [documents successful zoo breeding]
- Anon. 1997. Species of wild animals bred in captivity during 1994 and multiple generation captive birds. *Reptiles. International Zoo Yearbook* 35(1): 354-362. [documents successful breeding at Melbourne Zoo]
- Bennett, D. 1998. *Monitor Lizards: Natural History*,



- Biology and Husbandry. Edition Chimaira, Frankfurt am Main. 352 pp. [presents reproductive data]
- Boyer, D.M. & W.E. Lamoreaux. 1983. Captive reproduction in *Varanus gilleni* at the Dallas Zoo. Pp. 59-63. In: P.J. Tolson (ed.), Proceedings of the 7th International Herpetological Symposium on Captive Propagation and Husbandry. International Herpetological Symposium, Thurmont, Maryland. [describes successful breeding]
- Bröer, W. & H.-G. Horn. 1985. Erfahrungen bei der Verwendung eines Motorbruters zur Zeitung von Reptilieneiern. *Salamandra* 21(4): 304-310. [describes incubation]
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Card, W. 1995. Monitor lizards: This man's best friends. *Tropical Fish Hobbyist* 44(1): 148-163. [briefly documents successful breeding at Dallas Zoo]
- Collin, A. & F. Guerree. 2007. Maintenance et élevage en captivité de *Varanus gilleni*. *ReptilMag* 32: 30-33. [describes successful breeding]
- de Ruiter, M. 1993. Erste Nachzucht des Gray-Warans. *Die Aquarien- und Terrarien Zeitschrift* 46(10): 619. [briefly mentions successful hatching of *V. gilleni* at Dallas Zoo]
- Deutscher, J. 2006. Husbandry and reproduction of captive pygmy mulga monitors *Varanus gilleni*. *Reptiles Australia* 3(1): 20-25. [describes successful reproduction]
- Eidenmüller, B. 1994. Bemerkungen zur Haltung und Zucht von *Varanus acanthurus* Boulenger, 1885, *V. storri* Mertens, 1966 und *V. gilleni* Lucas & Frost, 1895. *Herpetofauna* (Weinstadt) 16(88): 6-12. [describes successful reproduction]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. In: Wilkie, A.H. (ed.), Proceedings of the 1997 International Herpetological Society Symposium. International Herpetological Society. [provides reproductive data]
- Eidenmüller, B. 2003. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. & R. Wicker. 1997. The breeding of Gillen's pygmy monitor *Varanus gilleni*, Lucas & Frost 1895. *Herpetofauna* (Sydney) 27(1): 2-6. [describes successful reproduction]
- Gow, G.F. 1982. Notes on the reproductive biology of the pygmy mulga monitor *Varanus gilleni*. *Northern Territory Naturalist* 1982(5): 4-5. [describes successful hatching of eggs from wild-caught female]
- Horn, H.-G. 1978. Nachzucht von *Varanus gilleni* (Reptilia: Sauria: Varanidae). *Salamandra* 14(1): 29- 32. [describes successful reproduction]
- Horn, H.-G. 2004. *Varanus gilleni*. Pp. 355-365. In: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington. [provides reproductive data]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. *International Zoo Yearbook* 28: 140-150. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1991. Basic data on the biology of monitors. Pp. 176-187. In: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research*, Mertensiella 2. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246. [presents reproductive data]
- Husband, G. 1991. Captive breeding of the pygmy mulga monitor at the Australian Reptile Park. *Australasian Herp News* 7: 10. [describes successful reproduction]
- Husband, G. & M. Vincent. 1999. The pygmy mulga monitor *Varanus gilleni*- take a look at one of Australia's fascinating diminutive monitor species. *Reptiles* 7(5): 10-18. [provides breeding information and describes successful reproduction]
- Kirschner, A., T. Müller & H. Seuffer. 1996. Faszination Warane. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Polleck, R. 2001. Haltung und Zucht vom Gillenwaran *Varanus gilleni* Lucas & Frost, 1895. *Herpetofauna* (Weinstadt) 23(131): 15-18. [describes successful

reproduction]

- Polleck, R. 2003. Haltung und Zucht von Gillen's Waran, *Varanus gilleni* Lucas & Frost, 1895. Monitor 9(1/2): 13-15. [describes successful reproduction]
- Ramm, T. 2013. Die erfolgreiche Haltung und Nachzucht von Gillens Zwergwaran (*Varanus gilleni*) im Terrarium. Draco 53: 45-50. [describes successful reproduction]
- Roberts, D. 1988. Gould's monitor hatched at the Dallas Zoo. AAZPA Newsletter 29(3): 16. [briefly mentions successful breeding at Dallas Zoo]
- Rogner, M. 1997. Monitor Lizards. Pp. 9-37. In: Lizards: Volume 2. Krieger, Malabar. [presents reproductive data]
- van der Koore, J. 1989. Kweek met varanen van 1966-1987. Lacerta 47(4): 106-107. [briefly mentions successful breeding at Dallas Zoo]
- Vincent, M. & S. Wilson. 1999. Australian Goannas. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]

### *Varanus glauerti*

- Bedford, G. 2006. Kimberly rock monitor *Varanus glauerti*- the Porsche of the reptile world. Reptiles Australia 6(2): 40-43. [describes successful reproduction]
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- de Zeeuw, M. 2010. Husbandry and reproduction of *Varanus glauerti* in captivity. Biawak 4(3): 103-107. [describes successful reproduction]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Good, D.H. 1999. An interview with Frank Retes. Reptiles 7(5): 32-47. [briefly mentions first successful breeding]
- Hörenberg, T. 2013. Parthenogenese bei *Varanus glauerti*. Draco 53: 29-30. [describes successful reproduction, parthenogenesis and egg-binding]
- Hörenberg, T. & A. Koch. 2013. Report from the fifth annual meeting of the "AG Warane und Krustenechsen". Biawak 7(1): 6. [brief mention of eggs received by the Reptilium Zoo (Landau)]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. In: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]
- Ramm, T. 2013. Haltung und erfolgreiche Nachzucht des Kimberley-Felswarans, *Varanus glauerti*. Draco 53: 20-28. [describes successful reproduction]
- Retes, F. & D. Bennett. 2001. Multiple generations, multiple clutches, and early maturity in four species of monitor lizards (Varanidae) bred in captivity. Herpetological Review 32(4): 244-245. [describes first successful breeding and provides reproductive data]
- Vincent, M. & S. Wilson. 1999. Australian Goannas. New Holland Publishers, Sydney. 152 pp. [provides reproductive data]

### *Varanus glebopalma*

- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides data on clutch size]
- Christian, T. 1977. Notes on *Varanus glebopalma*. Victorian Herpetological Society Newsletter 6: 11-13. [presents reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. In: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [presents reproductive data]

*Varanus kingorum*

- Anonymous. 1990. Species of wild animals bred in captivity during 1988/1989 and multiple generation births. *Reptiles. International Zoo Yearbook* 30: 326-342. [documents successful breeding at Australian Reptile Park]
- Anonymous. 1991. Reptiles bred in captivity and multiple generation births. *International Zoo Yearbook* 30: 326-342. [documents successful breeding at the Australian Reptile Park]
- Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [briefly mentions successful breeding but no further details are offered]
- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. *In: Wilkie, A.H. (ed.), Proceedings of the 1997 International Herpetological Society Symposium. International Herpetological Society*. [presents reproductive data]
- Eidenmüller, B. 1999. Haltung und Nachzucht von King's Felsenwaran, *Varanus kingorum* Storr, 1980. *Herpetofauna (Weinstadt)* 21(121): 19-23. [describes successful reproduction]
- Eidenmüller, B. 2001. Between the rocks: pick up tips on breeding and keeping King's rock monitors (*Varanus kingorum*). *Reptiles* 9(5): 78-81. [describes successful reproduction]
- Eidenmüller, B. 2003. Haltung und kontinuierliche Nachzucht von King's Felsenwaran, *Varanus kingorum* Storr 1980, mit der erstmaligen Nachzucht eines albinotischen Jungtieres. *Reptilia (DE)* 8(5): 37-40. [describes successful reproduction and production of albino offspring]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In: Swan, M. (ed.), Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and presents reproductive data]
- Kirschner, A., T. Müller & H. Seuffer. 1996. *Faszination Warane*. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Patanant, K.C. 2012. Heads you lose, tails you win: Notes on a tail-assisted foraging behavior in *Varanus (Odatria) kingorum*. *Biawak* 6(2): 74-77. [briefly documents successful breeding]
- Retes, F. & D. Bennett. 2001. Multiple generations, multiple clutches, and early maturity in four species of monitor lizards (Varanidae) bred in captivity. *Herpetological Review* 32(4): 244-245. [presents reproductive data]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]

*Varanus mitchelli*

- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [mentions reproduction at Perth Zoo]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [mentions a wild-caught gravid female laying eggs and incubation of the eggs]
- Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [mentions a wild-caught gravid female laying eggs and incubation of the eggs]



- Gaikhorst, G., J. McLaughlin, B. Larkin & M. McPharlin. 2010. Successful captive breeding of Mitchell's water monitor, *Varanus mitchelli* (Mertens 1958), at Perth Zoo. *Zoo Biology* 28(5): 615-625. [describes successful reproduction]
- Schultz, T. & S. Doody. 2004. *Varanus mitchelli*. Pp. 416-422. *In*: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington. [provides reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides reproductive data]

### *Varanus pilbarensis*

- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. *In*: Wilkie, A.H. (ed.), *Proceedings of the 1997 International Herpetological Society Symposium*. International Herpetological Society. [presents reproductive data]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. & C. Langner. 1998. Bemerkungen zu haltung zucht des Pilbara-Felsenwarans *Varanus pilbarensis* Storr, 1980. *Herpetofauna (Weinstadt)* 20(117): 5-10. [describes successful reproduction]
- Hörenberg, T. 2013. Der Pilbara-Waran, *Varanus pilbarensis* – Haltung und Nachzucht. *Draco* 53: 31-36. [describes successful reproduction]
- Retes, F. & D. Bennett. 2001. Multiple generations, multiple clutches, and early maturity in four species of monitor lizards (Varanidae) bred in captivity. *Herpetological Review* 32(4): 244-245. [presents reproductive data]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]

### *Varanus primordius*

- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Husband, G.A. 2001. Lebensweise und Haltung von *Varanus primordius*. *Draco* 7: 50-54. [describes successful reproduction]
- Husband, G.A. 2001. Natural history and captive maintenance of the northern bluntspined monitor *Varanus primordius*. *Herpetofauna (Sydney)* 31(2): 126-131. [describes successful reproduction]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-

583. In: Swan, M. (ed.), Keeping and Breeding Australian Lizards. Mike Swan Herp Books, Lilydale. [provides breeding information and presents reproductive data]
- Husband, G. & K. Christian. 2004. *Varanus primordius*. Pp. 434-437. In: Pianka, E.R., D.R. King & R.A. King (eds.), Varanoid Lizards of the World. Indiana University Press, Bloomington. [presents reproductive data]
- Kirschner, A., T. Müller & H. Seuffer. 1996. Faszination Warane. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Vincent, M. & S. Wilson. 1999. Australian Goannas. New Holland Publishers, Sydney. 152 pp. [documents first successful breeding at Territory Wildlife Park]

### *Varanus scalaris* and *V. similis*

- Anon. 1975. Species of wild animals bred in captivity during 1973 and multiple generation captive births. International Zoo Yearbook 15: 315-392 [documents successful zoo breeding]
- Bennett, D. 1994. Some remarks on longevity in monitor lizards. Southwestern Herpetological Society Journal (UK) 2(3): 27-29. [reports egg laying by a female over 20 years in age]
- Bennett, D. 1998. Monitor Lizards: Natural History, Biology and Husbandry. Edition Chimaira, Frankfurt am Main. 352 pp. [provides some breeding information and reproductive data]
- Berghof, H.-P. 2001. Die Pflege und Vermehrung des kleinen neuguineischen Baumwaran *Varanus (Odatria) similis* Mertens, 1958. Herpetofauna (Weinstadt) 23(135): 5-13. [describes successful reproduction]
- Berghof, H.-P. 2003. Bemerkungen über die Vermehrung des kleinen Papuabaumwaranes "*Varanus similis*". Monitor 9(1/2): 16-18. [describes successful reproduction]
- Berghof, H.-P. 2009. Der getüpfelte Baumwaran *Varanus (Odatria) similis*. Natur und Tier Verlag, Münster. 64 pp. [provides breeding information and presents reproductive data]
- Bröer, W. & H.-G. Horn. 1985. Erfahrungen bei der Verwendung eines Motorbruters zur Züchtung von Reptilieneiern. Salamandra 21(4): 304-310. [discusses successful incubation]
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Chippendale, P. 1991. Captive breeding of the Timor monitor (*Varanus timorensis similis*). Herpetological Review 22(2): 52-53. [describes successful reproduction]
- Eidenmüller, B. 1992. Einige Bemerkungen über die Züchtungsparameter von Warangelegen. Monitor 1(1): 14-20. [provides breeding information and presents reproductive data]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. In: Wilkie, A.H. (ed.), Proceedings of the 1997 International Herpetological Society Symposium. International Herpetological Society. [presents reproductive data]
- Eidenmüller, B. 2003. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. & R. Wicker. 1991. Einige Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) timorensis similis* Mertens, 1958. Salamandra 27(3): 187-193. [describes successful reproduction and a case of egg-binding at Frankfurt Zoo]
- Fost, M. 1996. Taxon management account: Timor monitor (spotted tree monitor) *Varanus timorensis* and *Varanus similis* (=scalaris). 14 pp. In: Hammack, S.H. (ed.), American Zoo and Aquarium Association Lizard Advisory Group, Taxon Management Accounts. Fort Worth Zoological Park, Fort Worth. [provides breeding information and presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. International Zoo Yearbook 28: 140-150. [presents reproductive data]

- Horn, H.-G. & G.J. Visser. 1991. Basic data on the biology of monitors. Pp. 176-187. *In*: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research, Mertensiella 2*. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246. [presents reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and presents reproductive data]
- Kirschner, A., T. Müller & H. Seuffer. 1996. *Faszination Warane*. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Lambertz, K. 1993. Nachzucht von *Varanus timorensis similis*. *Monitor* 2(2): 32. [describes successful reproduction]
- Lambertz, K. 1994. Haltung und Zucht von *Varanus similis*. *Elaphe* 2(2): 16-17. [describes successful reproduction]
- Moldovan, D. 2007. Haltung und Zucht von *Varanus (Odatia) similis* Mertens, 1958. *Sauria* 29(3): 21-26. [describes successful breeding]
- Moldovan, D. 2008. Husbandry and captive reproduction of *Varanus (Odatia) similis*, Mertens, 1958. *Biawak* 2(2): 89-94. [describes successful breeding]
- Rüegg, R. 1973. Vivarium: Nachzucht beim Timor-Waran. *Bulletin Zoologisches Garten, Basel* 31: 6-7. [describes successful breeding at Basel Zoo]
- Rüegg, R. 1974. Nachzucht beim Timor-Baumwaran, *Varanus timorensis similis* Mertens, 1958. *Aquarium mit Aquateerra* 8(62): 360-363. [describes successful breeding at Basel Zoo]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]

### *Varanus semiremex*

- Brown, D. 2012. *A Guide to Australian Monitors in Captivity*. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Horn, H.-G. & G.J. Visser. 1991. Basic data on the biology of monitors. Pp. 176-187. *In*: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research, Mertensiella 2*. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [presents reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. *In*: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and reproductive data]
- Irwin, S. Undated. Taxon Management Account: Arboreal/Aquatic Habitat Group. Queensland Reptile & Fauna Park, Beerwah. 10 pp. [briefly mentions eggs received by private keeper]
- Jackson, R. 2005. The poorly known rusty monitor *Varanus semiremex*: history, natural history, captive breeding and husbandry. *Herpetofauna* (Sydney) 35(1): 15-24. [describes successful reproduction at Australia Zoo]

### *Varanus storri*

- Anonymous. 1982. Species of wild animals bred in captivity during 1980 and multiple generation captive births. *Reptiles. International Zoo Yearbook* 22: 367-371. [documents successful zoo breeding]
- Anonymous. 1989. Species of wild animals bred in captivity during 1987 and multiple generation births. *Reptiles. International Zoo Yearbook* 29: 250-256. [documents successful zoo breeding]
- Anonymous. 1997. Secrets of the goanna man, part 1. *Vivarium* 9(2): 16-17, 65-66. [briefly mentions breeding]
- Bartlett, R.D. 1981. Notes on captive reproduction of *Varanus storri*. *Bulletin of the Chicago*



- Herpetological Society 16(3): 65-66. [describes successful reproduction]
- Bartlett, R.D. 1982. Initial observations on the captive reproduction of *Varanus storri*. Herpetofauna (Sydney) 13(2): 6-7. [describes successful reproduction]
- Bennett, D. 1998. Monitor Lizards: Natural History, Biology and Husbandry. Edition Chimaira, Frankfurt am Main. 352 pp. [provides reproductive data]
- Bröer, W. & H.-G. Horn. 1985. Erfahrungen bei der Verwendung eines Motorbruters zur Zeitung von Reptilieneiern. Salamandra 21(4): 304-310. [describes successful incubation]
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 1992. Einige Bemerkungen über die Zeitungsparamater von Warangelegen. Monitor 1(1): 14-20. [presents reproductive data]
- Eidenmüller, B. 1994. Bemerkungen zur Haltung und Zucht von *Varanus acanthurus* Boulenger, 1885, *V. storri* Mertens, 1966 und *V. gilleni* Lucas & Frost, 1895. Herpetofauna (Weinstadt) 16(88): 6-12. [describes successful reproduction]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. In: Wilkie, A.H. (ed.), Proceedings of the 1997 International Herpetological Society Symposium. International Herpetological Society. [presents reproductive data]
- Eidenmüller, B. 2003. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. & H.-G. Horn. 1985. Eigene Nachzuchten und der gegenwartige Stand der Nachzucht von *Varanus (Odatria) storri* Mertens, 1966. Salamandra 21(1): 55-61. [presents a review of reproductive data and breeding information]
- Flugi, U. 1990. Bericht über die Haltung und nachzucht des Storr'schen Zwergwarans (*Varanus storri*). Herpetofauna (Weinstadt) 12(67): 31-34. [describes successful reproduction]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. International Zoo Yearbook 28: 140-150. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. International Zoo Yearbook 35: 227-246. [presents reproductive data]
- Kendrick, J. 2005. Mini monitors. Reptiles 13(8): 44-52. [provides breeding information]
- Kirschner, A., T. Müller & H. Seuffer. 1996. Faszination Warane. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Mendyk, R.W. 2012. Reproduction of varanid lizards (Reptilia: Squamata: Varanidae) at the Bronx Zoo. Zoo Biology 31(3): 374-389. [presents reproductive data for eggs that did not hatch]
- Mudrack, W. 1969. Paarung und Eiablage bei *Varanus storri*. Aquaterra 6: 25-28. [documents egg laying]
- Rese, R. 1986. *Varanus storri* Mertens. Sauria 8(3): 55-56. [provides breeding information]
- Richmond, M. 2005. Captive breeding of Storr's monitor *Varanus storri*. Reptiles Australia 5(2): 40-43. [describes successful reproduction]
- Rogner, M. 1997. Monitor Lizards. Pp. 9-37. In: Lizards: Volume 2. Krieger, Malabar. [presents reproductive data]
- Stirnberg, G.E. & H.-G. Horn. 1981. Eine unerwartete Nachzucht im Terrarium: *Varanus (Odatria) storri*. Salamandra 17(1/2):55-62. [describes successful reproduction at Bochum Tierpark]
- Vincent, M. & S. Wilson. 1999. Australian Goannas. New Holland Publishers, Sydney. 152 pp. [provides breeding information]
- Zeigler, B. 1986. Storr's monitor hatched. AAZPA Newsletter 27(7): 17. [documents successful reproduction at Miami Metrozoo]

# *Varanus timorensis*

- Anonymous. 1975. Species of wild animals bred in captivity during 1973 and multiple generation captive births. *International Zoo Yearbook* 15: 315-392. [documents successful zoo breeding]
- Anonymous. 1980. Timor monitor lizard birth may be the first for the U.S.A. *International Zoo News*. 27(5/6):51-52. [documents successful reproduction at the Rio Grande Zoo]
- Anonymous. 1982. Species of wild animals bred in captivity during 1980 and multiple generation captive births. *reptiles. International Zoo Yearbook* 22: 367-371. [documents successful zoo breeding]
- Assmann, M. 1996. Über die Nachzucht des Timorwaran (*Varanus [Odatria] timorensis* Gray, 1831). *Monitor* 4(2): 41-42. [presents reproductive data]
- Behrmann, H.-J. 1981. Haltung und Nachzucht von *Varanus t. timorensis* (Reptilia: Sauria: Varanidae). *Salamandra* 17(3/4): 198-201. [describes successful reproduction]
- Belcher, D. 1981. Timor monitors hatched at Rio Grande Zoo. *AAZPA Newsletter* 22(2): 17. [documents successful reproduction at the Rio Grande Zoo]
- Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [provides breeding information and reproductive data]
- Chippendale, P. 1991. Captive breeding of the Timor monitor (*Varanus timorensis similis*). *Herpetological Review* 22(2): 52-53. [describes successful reproduction]
- de Bitter, P.M. 1981. *Varanus timorensis timorensis*. *Lacerta* 40(3): 48-49. [description of successful reproduction]
- Eidenmüller, B. 1986. Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) t. timorensis* (Gray, 1831). *Salamandra* 22(2/3): 157-161. [description of successful reproduction]
- Eidenmüller, B. 1992. Einige Bemerkungen über die Zeitigungsparamater von Warangelegen. *Monitor* 1(1): 14-20. [presents reproductive data]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. In: Wilkie, A.H. (ed.), *Proceedings of the 1997 International Herpetological Society Symposium*. International Herpetological Society. [presents reproductive data]
- Eidenmüller, B. 2003. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. *Warane: Lebensweise, Pflege, Zucht*. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. & R. Wicker. 1991. Einige Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) timorensis similis* Mertens, 1958. *Salamandra* 27(3): 187-193. [describes successful breeding and a case of egg-binding at Frankfurt Zoo]
- Post, M. 1996. Taxon management account: Timor monitor (spotted tree monitor) *Varanus timorensis* and *Varanus similis* (=scalaris). 14 pp. In: Hammack, S.H. (ed.), *American Zoo and Aquarium Association Lizard Advisory Group, Taxon Management Accounts*. Fort Worth Zoological Park, Fort Worth. [provides breeding information and presents reproductive data]
- Géczy, C. 2009. Cannibalism in captive *Varanus timorensis*. *Biawak* 3(2): 61-63. [documents successful reproduction]
- Gritis, P. 1992. Translation of Behrmann, H.-J. 1981. Haltung und Nachzucht von *Varanus t. timorensis*. *Salamandra* 17(3/4): 198-201. *Varanews* 2(6): 6. [describes successful breeding]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. *International Zoo Yearbook* 28: 140-150. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246. [presents reproductive data]
- Kirschner, A., T. Müller & H. Seuffer. 1996. *Faszination Warane*. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Lambertz, K. 1995. Haltung und Zucht des Timorwarans (*Varanus timorensis*) mit verschiedenen Zuchtgruppen. *Monitor* 4(1): 30-38. [describes successful reproduction]
- Moehn, L.D. 1984. Courtship and copulation in *Varanus timorensis*. *Herpetological Review* 15(1):

- 14- 16. [describes successful reproduction]
- Price, R.C. 1998. Notes on breeding the Timor monitor. *Dragon News* 2(2): 15-19. [describes successful reproduction]
- Rese, R. 1983. Der Timorwaran *Varanus timorensis timorensis*. Haltung und Zucht. *Sauria* 5(4): 13-15. [describes successful reproduction]
- Rogner, M. 1997. Monitor Lizards. Pp. 9-37. In: *Lizards: Volume 2*. Krieger, Malabar. [presents reproductive data]
- Rüegg, R. 1973. Vivarium: Nachzucht beim Timor-Waran. *Bulletin Zoologisches Garten, Basel* 31: 6-7. [describes successful reproduction at Basel Zoo]
- Rüegg, R. 1974. Nachzucht beim Timor-Baumwaran, *Varanus timorensis similis* Mertens, 1958. *Aquarium mit Aquaterra* 8(62): 360-363. [describes successful reproduction at Basel Zoo]
- Sautereau, L. & P. de Bitter. 1980. Notes sur l'élevage et la reproduction en captivité du varan de Timor (Sauria-Varanidae). *Bull. Soc. Herp. Fr.* 15: 4-9. [describes successful reproduction]
- Schmutz, P.E. & H.-G. Horn. 1986. Der Lebensraum von *Varanus (Odatria) t. timorensis* (Gray, 1831) (Sauria: Varanidae). *Salamandra* 22(2/3): 147-156. [describes successful reproduction]
- van der Koore, J. 1988. De week van varanen in gevangenschap. *Lacerta* 47(2): 35-39. [describes unsuccessful breeding attempts]
- Walls, J.G. 2006. Terrific Timors. *Reptiles* 14(2): 30, 32-33. [provides breeding information]

#### *Varanus tristis*

- Anonymous. 1987. Species of wild animals bred in captivity during 1985 and multiple generation births. reptiles. *International Zoo Yearbook* 27: 346-351. [documents successful zoo breeding]
- Anonymous. 1990. Species of wild animals bred in captivity during 1988/1989 and multiple generation births. Reptiles. *International Zoo Yearbook* 30: 326-342. [documents successful zoo breeding]
- Anonymous. 1991. Reptiles bred in captivity and multiple generation births. *International Zoo Yearbook* 30: 326-342. [documents successful breeding at the Wilhelma, Stuttgart]
- Anonymous. 1997. Species of wild animals bred in captivity during 1994 and multiple generation captive birds. Reptiles. *International Zoo Yearbook* 35(1): 354-362. [documents successful breeding at the Wilhelma, Stuttgart]
- Anonymous. 1998. Secrets of the goanna man, part 2. *Vivarium* 9(3): 65-66. [presents reproductive data]
- Bennett, D. 1998. Monitor Lizards: Natural History, Biology and Husbandry. Edition Chimaira, Frankfurt am Main. 352 pp. [provides breeding information and reproductive data]
- Bröer, W. & H.-G. Horn. 1985. Erfahrungen bei der Verwendung eines Motorbruters zur Zeitung von Reptilieneiern. *Salamandra* 21(4): 304-310. [describes successful incubation]
- Brown, D. 2012. A Guide to Australian Monitors in Captivity. Reptile Publications, Burleigh. 263 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 1989. Beobachtungen bei der Haltung und Nachzucht von *Varanus (Odatria) tristis orientalis*. *Salamandra* 25(3/4): 265-271. [describes successful reproduction]
- Eidenmüller, B. 1992. Einige Bemerkungen über die Zeitungsparamater von Warangelegen. *Monitor* 1(1): 14-20. [presents breeding information and reproductive data]
- Eidenmüller, B. 1997. The monitor family. Pp. 35-46. In: Wilkie, A.H. (ed.), *Proceedings of the 1997 International Herpetological Society Symposium*. International Herpetological Society. [presents reproductive data]
- Eidenmüller, B. 2003. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 174 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [provides breeding information and reproductive data]
- Eidenmüller, B. 2009. Warane: Lebensweise, Pflege, Zucht. Herpeton Verlag, Offenbach. 207 pp. [provides breeding information and reproductive data]
- Hörenberg, T. 2009. Kaiserschnitt bei *Varanus (Odatria) tristis orientalis*. *Sauria* 31(4): 31-34. [describes successful reproduction and a case of egg-binding]



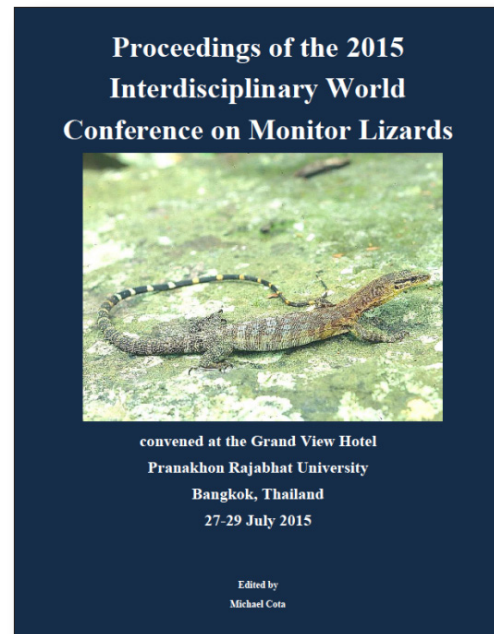
- Hörenberg, T. 2009. *Varanus (Odatia) tristis orientalis*: Keeping and breeding the gray-back monitor. *Reptilia* (GB) 64: 26-34. [describes successful reproduction]
- Hörenberg, T. 2013. Erfahrungen bei der Pflege und Nachzucht des Schwarzkopfwarans, *Varanus tristis tristis*. *Draco* 53: 69-77. [describes successful reproduction]
- Horn, H.-G. & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus* spp. in captivity. *International Zoo Yearbook* 28: 140-150. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1991. Basic data on the biology of monitors. Pp. 176-187. In: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research*, Mertensiella 2. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [presents reproductive data]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227-246. [presents reproductive data]
- Husband, G. & M. Bonnett. 2009. Monitors. Pp. 484-583. In: Swan, M. (ed.), *Keeping and Breeding Australian Lizards*. Mike Swan Herp Books, Lilydale. [provides breeding information and presents reproductive data]
- Kendrick, J. 2005. Mini monitors. *Reptiles* 13(8): 44-52. [provides breeding information]
- Kirschner, A., T. Müller & H. Seuffer. 1996. *Faszination Warane*. Kirschner & Seuffer Verlag, Keltern-Weiler. 254 pp. [provides breeding information and reproductive data]
- Körner, M. 1999. Die erfolgreiche Nachzucht des Australischen Trauerwarans (*Varanus tristis orientalis*). *Monitor* 8(2): 5-11. [describes successful reproduction]
- McDonald, B. 1999. Captive husbandry and reproduction of the freckled monitor (*Varanus tristis orientalis*) (Fry 1913). *Monitor* (Journal of the Victorian Herpetological Society) 10(2/3): 69-75. [describes successful reproduction]
- O'dell, J. 1993. Breeding *Varanus tristis orientalis*. *Varanews* 3(2): 4-6. [describes successful reproduction]
- O'dell, J. 1996. The freckled monitor. *Reptiles* 4(7): 32-38. [describes successful reproduction]
- Rogner, M. 1997. Monitor Lizards. Pp. 9-37. In: *Lizards: Volume 2*. Krieger, Malabar. [presents reproductive data]
- Schardt, M. 2001. Haltung und Zucht von *Varanus (Odatia) tristis orientalis* Fry, 1913. *Draco* 7: 62-66. [describes successful reproduction]
- Wesiak, K. 2007. Die Nachzucht des getüpfelten Baumwarans *Varanus (Odatia) tristis orientalis* Fry, 1913, als Resultat einer konstruktiven Zusammenarbeit. *Sauria* 29(4): 49-52. [describes successful reproduction]
- Vincent, M. & S. Wilson. 1999. *Australian Goannas*. New Holland Publishers, Sydney. 152 pp. [provides breeding information and reproductive data]

# RECENT PUBLICATIONS

- Bucklitsch, Y., W. Böhme & A. Koch. 2016. Scale morphology and micro-structure of monitor lizards (Squamata: Varanidae: *Varanus* spp.) and their allies: Implications for systematics, ecology, and conservation. *Zootaxa* 4153(1): 1-192.
- Dick, T.J.M., J.M. Wakeling & C.J. Clemente. 2016. Scaling of muscle architecture: From world's smallest to world's largest monitor lizard. *Integrative and Comparative Biology* 56(Supplement 1): E277.
- Ducey, S.D., J.S. Cooper & M.C. Wadman. 2016. Bitten by a dragon. *Wilderness & Environmental Medicine* 27(2) 291-293.
- Eidenmüller, B. 2016. Keeping and Breeding Emerald Monitors: The *Varanus prasinus* Group. Edition Chimaira, Frankfurt am Main. 94 pp.
- Gunawardena, S.A. 2016. Artefactual incised wounds due to postmortem predation by the Sri Lankan water monitor (kabaragoya). *Forensic Science, Medicine, and Pathology* 12(3): 324-330.
- Han, D. & B.A. Young. 2016. Anatomical basis of dynamic modulation of tympanic tension in the water monitor lizard, *Varanus salvator*. *The Anatomical Record* 299(9): 1270-1280.
- Honoré, E., T. Rakza, B. Senut, P. Deruelle & E. Pouydebat. 2016. First identification of non-human stencil hands at Wadi Sūra II (Egypt): A morphometric study for new insights into rock art symbolism. *Journal of Archaeological Science: Reports* 6: 242-247.
- Hyde, E.R., J.A. Navas-Molina, S.J. Song, J.G. Jueneman, G. Ackermann, C. Cardona, G. Humphrey, D. Boyer, T. Weaver, J.R. Mendelson, V.J. McKenzie, J.A. Gilbert & R. Knight. 2016. The oral and skin microbiomes of captive Komodo dragons are significantly shared with their habitat. *mSystems* 1(4): e00046-16.
- Johnson, P.M., M. Altmanová, M. Rovatsos, P. Velenský, R. Vodička, I. Rehák & L. Kratochvíl. 2016. First description of the karyotype and sex chromosomes in the Komodo dragon (*Varanus komodoensis*). *Cytogenetic and Genomic Research* 148: 284-291.
- King, C. & H.I. Jones. 2016. The life cycle of the reptile-inhabiting nematode *Abbreviata hastaspicula* (Spirurida: Physalopteridae: Physalopterinae) in Australia. *International Journal for Parasitology: Parasites and Wildlife* 5(3): 258-262.
- Koch, A. 2016. Der Blaue Baumwaran (*Varanus macraei*) von Batanta: Wunderschön und stark bedroht. *Reptilia* 21(122): 38-41.
- Law, S.J., S.R. de Kort, D. Bennett & M. van Weerd. 2016. Morphology, activity area, and movement patterns of the frugivorous monitor lizard *Varanus bitatawa*. *Herpetological Conservation and Biology* 11: 467-475.
- Lin, L.-H. & J.J. Wiens. 2016. Comparing macroecological patterns across continents: Evolution of climatic niche breadth in varanid lizards. *Ecography*. DOI: 10.1111/ecog02343.
- Openshaw, G.H., D.C. D'Amore, M. Vidal-Garcia & J.S. Keogh. 2016. Combining geometric morphometric analysis of multiple 2D observation views improves interpretation of evolutionary allometry and shape diversification in monitor lizard (*Varanus*) crania. *Biological Journal of the Linnean Society*. DOI: 10.1111/bij.12899.
- Smith, J., S. Legge, A. James & K. Tuft. 2016. Optimising camera trap deployment design across multiple sites for species inventory surveys. *Pacific Conservation Biology*. DOI: 10.1071/PC16017.
- Uyeda, L.T., E. Iskandar, A. Purbatrapila, J. Pamungkas, A. Wirsing & R.C. Kyes. 2016. The role of traditional beliefs in conservation of herpetofauna in Banten, Indonesia. *Oryx* 50(2): 296-301.
- Ward-Fear, G., J. Thomas, J.K. Webb, D.J. Pearson & R. Shine. 2016. Eliciting conditioned taste aversion in lizards: Live toxic prey are more effective than scent and taste cues alone. *Integrative Zoology*. DOI: 10.1111/1749-4877.12226.
- Wines, M.P. 2016. Dragon trappers. *Reptiles* 24(6): 34-39.
- Young, B.A., J. Dumals, N. John, B. Lyons, A. Macduff, M. Most, N.A. Reiser & P.J. Reiser. 2016. Functional segregation within the muscles of aquatic propulsion in the Asiatic water monitor (*Varanus salvator*). *Frontiers in Physiology* 7(380): 1-13.
- Zena, L.A., E.M. Fonseca, J.M. Santin, L. Porto, L.H. Gargaglioni, K.C. Bicego & L.K. Hartzler. 2016. Effect of temperature on chemosensitive locus coeruleus neurons of savannah monitor lizards, *Varanus exanthematicus*. *Journal of Experimental Biology* 219: 2856-2864.

## Contents of the Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards

- Bennett, D. 2016. The Polillo Butaan Project 1999-2010; Lessons learned in the study of *Varanus olivaceus* (Howell, 1957). Pp. 237-247. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Cota, M. & U. Krebs. 2016. Do the hatchlings of Dumeril's monitor (*Varanus dumerilii*) Schlegel, 1839 display batesian mimicry? A conspicuous phenomenon and its presumptive evidence. Pp. 69-92. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Hyde, E.R., J. A. Navas-Molina, S.J. Song, G. Ackermann, G. Humphrey, D. Boyer, T. Weaver, J.R. Mendelson III & R. Knight. 2016. The captive Komodo dragon (*Varanus komodoensis* Ouwens, 1912) microbiome: Novel taxa, inter-zoo variation, and comparison to other reptiles. Pp. 199-219. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Jessop, T.S., G.R. Gillespie & M. Letnic. 2016. Examining multi-scale effects of the invasive fox on a large varanid (*Varanus varius* White, 1790) mesopredator. Pp. 221-236. *In*: Cota M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Kirshner, D.S. 2016. Notes on the nesting behaviors of heath monitors, *Varanus rosenbergi* Mertens, 1957, in the Sydney region. Pp. 105-121. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok Thailand.
- Krebs, U. 2016. The feeding act in a few varanid species. A description with systematic and evolutionary implications. Pp. 151-165. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Mendyk, R.W., M. Baumer, L. Augustine & E.S. Herrelko. 2016. A comparative assessment of varanid lizard thermal husbandry in zoos and private collections: Disparate ideologies or a paradigm disconnect? Pp. 175-197. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Pianka, E.R. & S.S. Sweet. 2016. Field observations by two American varanophiles. Pp. 1-68. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Recchio, I. 2016. Reproduction of the rare frugivorous monitor lizard *Varanus olivaceus* (Hallowell, 1857), at the Los Angeles Zoo and Botanical Gardens. Pp. 93-103. *In*: Cota, M. (eds.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Stanner, M. 2016. Burrowing behavior and burrowing-derived behavior of *Varanus griseus* (Daudin, 1803). Pp. 167-174. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.
- Sweet, S.S. 2016. Chasing flamingos: Toxicofera and the misinterpretation of venom in varanid lizards. Pp. 123-149. *In*: Cota, M. (ed.), Proceedings of the 2015 Interdisciplinary World Conference on Monitor Lizards. Suan Sunandha Rajabhat University, Bangkok, Thailand.







*Varanus niloticus* and water thick-knees (*Burhinus vermiculatus*). Chobe River National Park, Botswana. Photographed by Jeffrey Ives.