

An Annotated Bibliography of Captive Reproduction in Monitor Lizards (Varanidae: *Varanus*). Part III. *Soterosaurus*

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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 *Soterosaurus*, commonly known as water monitors. 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 (Branch, 1991). Eggs had also been received but not hatched by other keepers 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 were scattered across the ground of the 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 (Staedeli, 1962). 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 (Horn & Visser, 1997; Eidenmüller, 2007; Husband & Bonnett, 2009; Brown, 2012).

In previous bibliographic installments, I have focused on the *Varanus* subgenera *Odatria*, *Empagusia* and *Phillipinosaurus* and the *V. prasinus* complex belonging to the subgenus *Euprepiosaurus* (Mendyk, 2015, 2016, 2017). Here, the focus is directed towards species belonging to the subgenus *Soterosaurus*, and more specifically the *V. salvator* species complex; otherwise known as water monitors. This group is currently comprised of nine semi-aquatic species that are distributed throughout southern and Southeast Asia, and numerous islands throughout the Indo-Australian Archipelago. Although a Sri Lankan *V. salvator* currently holds the record for the longest lizard ever recorded, at 3.21 m in total length (Randow, 1932), *V. komodoensis* regularly reaches larger sizes and proportions. Still, members of the *V. salvator* complex rank among the largest lizards in the world, and are certainly the most commonly kept of the giant monitor species. Several species belonging to this group including *V. salvator*, *V. cumingi*, *V. nuchalis*, *V. togianus* and *V. marmoratus* have been maintained in captive collections; however, documented cases of successful captive reproduction are known only for two species: *V. salvator* and *V. cumingi*. The following bibliography, which represents a continuation of what will be several installments on the captive breeding of monitor lizards, focuses chiefly on water monitors

belonging to the subgenus *Soterosaurus*. Similar works that address other subgenera are forthcoming.

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 gain familiarity 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.

Increased interest in the taxonomy and systematics of the *V. salvator* complex over the past decade has led to various taxonomic revisions of the complex (Koch *et al.*, 2007; Welton *et al.*, 2013) as well as the description of several new species and subspecies (Koch & Böhme, 2010; Koch *et al.*, 2010; Welton *et al.*, 2014). Therefore, although best efforts were made to properly assign each publication to the appropriate taxon, due to limited information, it is possible that some accounts listed for one species may represent that of another.

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 so that they 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

- 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.
- _____. 1992. The life and leguans of "Gogga" Brown. *African Wildlife* 45(4): 172–175.
- 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.
- Cox, J. 1831. On the anatomy of a monitor. *Proceedings of the Committee of Science & Correspondence of the Zoological Society of London, Part 1 (1830-1831)*: 137–138.
- de Jong, J.K. 1944. Newly hatched *Varanus komodoensis*. *Treubia* 18: 143–145.
- Eidenmüller, B. 1986. Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) t. timorensis* (Gray, 1831). *Salamandra* 22(2/3): 157–161.
- _____. 2007. *Monitor Lizards: Natural History, Captive Care & Breeding*. Edition Chimaira, Frankfurt am Main, 176 pp.
- _____ & H.-G. Horn. 1985. Eigene Nachzuchten und der gegenwertige Stand der Nachzucht von *Varanus (Odatria) storri* Mertens, 1966. *Salamandra* 21(1): 55–61.
- Stirnberg, G.E. & H.-G. Horn. 1981. Eine unerwartete Nachzucht im Terrarium: *Varanus (Odatria) storri*. *Salamandra* 17(1/2):55–62.
- Horn, H.-G. 1978. Nachzucht von *Varanus gilleni* (Reptilia: Sauria: Varanidae). *Salamandra* 14(1): 29–32.
- _____ & G. Petters. 1982. Beitrage zur Biologie des Rauhnackenwarans, *Varanus (Dendrovaranus) rudicollis* Gray. *Salamandra* 18(1/2): 29–40.
- _____ & G.J. Visser. 1989. Review of reproduction of monitor lizards *Varanus spp.* in captivity. *International Zoo Yearbook* 28: 140–150.
- _____ & _____. 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.
- Koch, A. & W. Böhme. 2010. Heading east: A new subspecies of *Varanus salvator* from Obi Island, Maluku Province, Indonesia, with a discussion about the easternmost natural occurrence of southeast Asian water monitor lizards. *Russian Journal of Herpetology* 17(4): 299–309.
- _____, M. Auliya, A. Schmitz, U. Kuch & W. Böhme. 2007. Morphological studies on the systematics of the South East Asian water monitors (*Varanus salvator* complex): Nominotypic populations and taxonomic overview. Pp. 109–180. *In*: Horn, H.-G., W. Böhme & U. Krebs (eds.), *Advances in Monitor Research III, Mertensiella 16*. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach.
- _____, M. Gaulke & W. Böhme. 2010. Unraveling the underestimated diversity of Philippine water monitor lizards (Squamata: *Varanus salvator* complex), with the description of two new species and a new subspecies. *Zootaxa* 2446: 1–54.
- Lachmann, S. 1889. Die Bewohner meiner Terrarien. *Isis: Zeitschrift für alle naturwissenschaftlichen Liebhabereien* 14(23): 181–182.
- Mendyk, R.W. 2015. An annotated bibliography of the captive husbandry, breeding, behavior, veterinary management and trade of tree monitor lizards (*Varanus prasinus* complex). *Biawak* 9(2): 58-77.
- _____. 2016. An annotated bibliography of captive reproduction in monitor lizards (Varanidae: *Varanus*). Part I. *Odatria*. *Biawak* 10(2): 54–71.
- _____ 2017. An annotated bibliography of captive reproduction in monitor lizards (Varanidae: *Varanus*). Part II. *Empagusia* and *Philippinosaurus*. *Biawak* 11(1): 40–49.
- 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.
- Randow, H. 1932. Fauna und Flora von Dehiwala auf Ceylon. *Wochenschrift für Aquarien- und Terrarienkunde* 29(30): 471–473.
- 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.
- 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.
- Welton, L.J., S.L. Travers, C.D. Siler & R.M. Brown. 2014. Integrative taxonomy and phylogeny-based species delimitation of Philippine water monitor lizards (*Varanus salvator* Complex) with descriptions of two new cryptic species. *Zootaxa* 3881(3): 201–227.
- _____, C.D. Siler, J.R. Oaks, A.C. Diesmos & R.M. Brown. 2013. Multilocus phylogeny and Bayesian estimates of species boundaries reveal hidden evolutionary relationships and cryptic diversity in Southeast Asian monitor lizards. *Molecular Ecology* 22(13): 3495–3510.

Subgenus: Soterosaurus

Varanus salvator

- Acharjyo, L.N. & S. Mobapatra. 1980. Eggs of the water monitor (*Varanus salvator*) laid in captivity. *Indian Forester* 106(3): 230. [documents a female laying infertile eggs at the Nandankanan Biological Park]
- Andrews, H.V. 1995. Sexual maturation in *Varanus salvator* (Laurenti, 1978), with notes on growth and reproductive effort. *Herpetological Journal* 5: 189–194. [describes successful reproduction at Madras Crocodile Bank]
- _____. & M. Gaulke. 1990. Observations of the reproductive biology and growth of the water monitor (*Varanus salvator*) at the Madras Crocodile Bank. *Hamadryad* 15(1): 1–5. [describes double-clutching and successful reproduction]
- _____. & R. Whitaker. 1997. Captive breeding of the water monitor lizard (*Varanus salvator* Laurenti, 1768). Pp. 215–222. *In: De Silva, A.* (ed.), *Proceedings of the International Conference on the Biology and Conservation of the Amphibians and Reptiles and Reptiles of South Asia*. Amphibia and Reptile Organization of Sri Lanka, Kandy. [describes successful F2 breeding]
- Anonymous. 1971. Species of wild animals bred in captivity during 1969. reptiles. *International Zoo Yearbook* 11: 316–320. [documents successful breeding at Ahmedabad Zoo]
- _____. 1973. Species of wild animals bred in captivity during 1971. reptiles. *International Zoo Yearbook* 13: 286–288. [documents successful breeding at Zurich Zoo]
- _____. 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]
- _____. 1979. *Varanus salvator* breeding at the Madras Snake Park. *Hamadryad* 3(2): 4. [documents successful breeding]
- _____. 1980. San Antonio hatches Malayan water monitors. *International Zoo News* 27(5/6): 51–52. [documents successful breeding]
- _____. 1980. Eggs of the water monitor (*V. salvator*) laid in captivity. *Indian Forester* 106(3): 230. [documents eggs laid in captivity]
- _____. 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]
- _____. 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]
- _____. 1983. Species of wild animals bred in captivity during 1981 and multiple generation captive births. reptiles. *International Zoo Yearbook* 23: 267–272. [documents successful zoo breeding]
- _____. 1986. Species of wild animals bred in captivity during 1984 and multiple generation births. reptiles. *International Zoo Yearbook* 26: 417–427. [documents successful zoo breeding]
- _____. 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]
- _____. 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]
- _____. 1990a. 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]
- _____. 1991. *Varanus salvator* (and *Varanus indicus*, too). *Varanews* 1(6): 4. [documents successful F2 breeding at Madras Crocodile Bank]
- _____. 1991. Reptiles bred in captivity and multiple generation births. *International Zoo Yearbook* 30: 326–342. [documents successful breeding at Gladys Porter Zoo and Madras Crocodile Bank]
- _____. 1992. Captive breeding news: Malayan water monitors. *Varanews* 2(6): 1. [documents breeding at Sedgwick County Zoo]
- _____. 1993. Sexing. *Varanews* 3(1): 4. [discusses sex determination]
- _____. 1996. Berichtje in Hart voor Dieren april 1996. Nieuwsbrief van de Nederlandse Doelgroep Varanen 3(1): 1. [documents successful reproduction at Iguana Reptile Zoo, and hatching of melanistic offspring]
- _____. 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 Cologne Zoo, Sedgwick County Zoo and Zurich Zoo]
- _____. 2008. Groundbreaking international conference on “India’s conservation breeding initiative”. *Zoos’ Print* 23(12): 5–12. [discusses a conservation breeding program initiated by Chidiyatapu Zoo]
- _____. 2010. Finnish zoo receives eggs from black water monitor. *Biawak* 4(4): 112–113. [documents successful breeding of melanistic form at Helsinki Tropicario]
- Avadhani, R. 2008. *Varanus salvator*: India’s largest lizard, the water monitor. *Reptilia (GB)* 57: 43–47. [brief mention of eggs received at Chamarajendra Zoological Gardens]
- Bennett, D. 1998. *Monitor Lizards: Natural History, Biology and Husbandry*. Edition Chimaira, Frankfurt am Main. 352 pp. [presents general reproductive data]
- Biswas, S. & S. Kar. 1981. Some observations on nesting habits and biology of *Varanus salvator* (Laurenti) of Bhitarkanika Sanctuary, Orissa. *Journal of the Bombay Natural History Society* 78: 303–308. [describes hatching wild-collected eggs in captivity]
- Bowers, M.J. 1981. *Varanus salvator* bred in captivity. *San Antonio News from the Zoo* 7(2): 1–2. [describes successful reproduction at San Antonio Zoo]
- _____. 1981. Malayan water monitor (*Varanus salvator*). *Notes from NOAH* 8(9): 3–5. [documents and describes successful reproduction at San Antonio Zoo]
- David, R. 1970. Breeding the mugger crocodile and water monitor, *Crocodylus palustris* and *Varanus salvator*, at Ahmedabad Zoo. *International Zoo Yearbook* 10: 116–117. (describes successful breeding at Municipal Hill Garden Zoo, Ahmedabad, India)
- Dieter, C. 1999. Keeping and breeding the Asian water monitor- gentle giants. *Reptile & Amphibian Hobbyist* 5(2): 22–27. [describes successful breeding]
- DiSabato, L. & J. Laszlo. 1980. Water monitors hatched at San Antonio Zoo. *AAZPA Newsletter* 21(8): 19. [documents successful reproduction at San Antonio Zoo]
- Dwyer, Q. & M. Perez. 2007. Husbandry and reproduction of the black water monitor, *Varanus salvator komaini*. *Biawak* 1(1): 13–20. [describes successful reproduction of melanistic form at Parque Reptilandia, Costa Rica]
- _____. & _____. 2007. *Varanus salvator komaini* (black water monitor). Reproduction. *Biawak* 1(2): 89. [provides reproductive data for a melanistic

- form bred at Parque Reptilandia, Costa Rica]
- Eidenmüller, B. 2007. Monitor Lizards: Natural History, Captive Care & Breeding. Edition Chimaira, Frankfurt am Main, 176 pp. [presents general reproductive data]
- Erdelen, W. 1991. Conservation and population ecology of monitor lizards: the water monitor *Varanus salvator* (Laurenti, 1768) in south Sumatra. Pp. 120–135. *In*: Böhme, W. & H.-G. Horn (eds.), *Advances in Monitor Research*, Mertensiella 2. Deutsch Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach. [discusses a pilot breeding project in Pelambang, Sumatra]
- Ettling, J. 1992. Malayan water monitors hatch at the Sedgwick County Zoo & Botanical Garden. *AAZPA Communique*, September: 16. [documents successful breeding at Sedgwick County Zoo]
- Gaulke, M. & H.-G. Horn. 2004. *Varanus salvator* (nominate form). Pp. 244–257. *In*: Pianka, E.R., D.R. King & R.A. King (eds.), *Varanoid Lizards of the World*. Indiana University Press, Bloomington. [presents reproductive data]
- Goode, M. 1993. Hatchings occur at the Columbus Zoo. *AAZPA Communique*, April: 14. [documents successful reproduction of a melanistic form at Columbus Zoo]
- Graham, K. 1994. Summary of *Varanus salvator* reproductive data at the Sedgwick County Zoo. *Varanews* 4(1): 2–3. [describes successful reproduction on the Sedgwick County Zoo]
- Grim, F. 1997. Een geslaagde nakweek met *Varanus salvator* (Laurenti, 1768). *Nieuwsbrief van de Nederlandse Doelgroep Varanen* 4(4): 1–5. [describes successful breeding]
- Groves, J. 1984. Water monitor hatched. *AAZPA Newsletter* 25(8): 12. [documents successful reproduction at the Philadelphia Zoo]
- Hairston, C.S. & P. Burchfield. 1990. A sustained captive breeding programme for a large varanid lizard *Varanus salvator* at the Gladys Porter Zoo. *AAZPA Regional Conference Proceedings 1990*: 22–28. [describes successful reproduction at Gladys Porter Zoo]
- _____ & _____. 1992. The reproduction and husbandry of the water monitor *Varanus salvator* at the Gladys Porter Zoo, Brownsville. *International Zoo Yearbook* 31:124–130. [describes successful reproduction at the Gladys Porter Zoo]
- Herrmann, H.-W. 1999. Husbandry and captive breeding of the water monitor, *Varanus salvator* at the Cologne Aquarium (Cologne Zoo). Pp. 95–103. *In*: Horn, H.-G. & W. Böhme (eds.), *Advances in Monitor Research 2*, Mertensiella 11. Deutsche Gessellschaft für Herpetologie und Terrarienkunde, Rheinbach. [describes successful reproduction at Cologne Zoo]
- Honegger, R.E. 1978. Geschlechtsbestimmung bei Reptilien. *Salamandra* 14(2): 69–79. [describes successful reproduction and sex determination]
- Horn, H.-G. & G.J. Visser. 1989. Review of



Varanus salvator macro-maculatus. Bangkok, Thailand. Photographed by Robert W. Mendyk

- reproduction of monitor lizards *Varanus* spp in captivity. *International Zoo Yearbook* 28: 140–150.
- ____ & _____. 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. [provides reproductive data]
- ____ & _____. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. *International Zoo Yearbook* 35: 227–246. [provides reproductive data]
- Hudson, R., A. Alberts, S. Ellis & O. Byers. 1994. Conservation Assessment and Management Plan for Iguanidae and Varanidae. Aza Lizard Taxon Advisory Group & IUCN/SSC Conservation Breeding Specialist Group, Apple Valley. 247 pp. [mentions *Varanus salvator* bred 10 times in the USA, and in “good numbers” in India]
- ____ & D. Mehaffey. 1985. Asian water monitors hatched (*Varanus salvator*). *AAZPA Newsletter* 26(8): 26. [documents successful zoo breeding]
- Jes, H. 1994. Erfolgreiche Zucht des Bindenwarans (*Varanus salvator*). *Monitor* 3(1): 23–24. [documents successful reproduction at Cologne Zoo]
- Kala, N. 1998. Captive breeding of *Varanus salvator andamanensis* Deraniyagala, 1944. *Hamadryad* 22(2): 122–123. [describes successful reproduction at Haddo Mini Zoo]
- Kawata, K. 2012. Herpetology in Japanese zoos. *Herpetological Review* 43(2): 210–223. [documents successful breeding at Maruyama Zoo]
- Kirschner, A., T. Müller & H. Seufer. 1996. *Faszination Warane*. Kirshner & Seufer Verlag, Keltern Weiler. 254 pp. [presents general reproductive data]
- Kratzer, H. 1973. Beobachtungen Über die Zeitigungsdauer eines Eigeleges von *Varanus salvator* (Sauria: Varanidae). *Salamandra* 9(1): 27–33. [describes successful hatching from eggs received from an imported female]
- Mendyk, R.W. 2012. Reproduction of varanid lizards (Reptilia: Squamata: Varanidae) at the Bronx Zoo. *Zoo Biology* 31(3): 374–389. [presents reproductive data]
- Moharana, S. & S. Patis. 1983. Het eierleggen van *Varanus salvator* in het Nandankanan Zoological Park in India. *Lacerta* 41(4): 67–68. [discusses single female laying eggs, and prospects for commercially farming *Varanus salvator*]
- Mohr, M. 1930. Over eieren van *Varanus salvator* en van *Python curtus*. *De Tropische Natuur* 19(9): 156–157. [documents egg laying at Delisch Dierenpark]
- Müller, P. 1970. Notes on reptile breeding at Leipzig Zoo. *International Zoo Yearbook* 10: 104–105. [documents egg laying at Leipzig Zoo]
- Ott, T. 1997. Nachzuchtergebnisse von *Varanus salvator*. *Elaphe* 5(4): 6–11. [describes successful F2 breeding]
- Pagel, T. & W. Spieß. 2011. Der Zoologische Garten in Cöln eröffnet am 22. Juli 1860-150 Jahre Wildtierhaltung und zucht. *Der Zoologische Garten* 80: 117–202. [documents successful breeding at Cologne Zoo]
- Rodriguez, P. 2009. Keeping and breeding *Varanus salvator*. Pp. 257–259. *In*: Sprackland, R.G., *Giant Lizards*. 2nd ed. TFH Publications, Neptune. [describes successful reproduction]
- Uricheck, M.J. 1991. Notes on the varanid workshop. Pp. 181–184. *In*: Uricheck, M.J. (ed.), *Proceedings of the 15th International Herpetological Symposium on Captive Propagation and Husbandry*. Western Connecticut State University, Connecticut. [mentions Gladys Porter Zoo’s breeding of *V. salvator* over four years]
- van der Koore, J. 1989. Kweek met varanen van 1966-1987. *Lacerta* 47(4): 106–107. [reviews previous accounts of reproduction at Zurich Zoo and Madras Snake Park]
- van Kalken, C. 1997. Dialezing Frank Grim. *Nieuwsbrief van de Nederlandse Doelgroep Varanen* 3(6): 1–2. [documents egg laying in the Netherlands]
- Whitaker, R. 1996. Up to ears in crocs. *Reptiles* 4(4): 76–91. [describes successful reproduction at the Madras Crocodile Bank]
- Whitaker, Z. 1985. A snake park as a conservation centre. *Oryx* 19: 17–21. [discusses captive breeding at Madras Crocodile Bank]

Varanus cumingi

- Anonymous. 1970. Census of rare animals in captivity. Reptiles. International Zoo Yearbook 10: 334–343. [documents successful zoo breeding]
- _____. 1997. Species of wild animals bred in captivity during 1994 and multiple generation captive births. Reptiles. International Zoo Yearbook 35(1): 354–362. [documents successful breeding at Frankfurt Zoo]
- Horn, H.-G. & G.J. Visser. 1997. Review of reproduction of monitor lizards *Varanus* spp. in captivity II. Int. Zoo Yb, 35: 227–246. [presents reproductive data]
- Kirschner, A., T. Müller & H. Seufer. 1996. Faszination Warane. Kirshner & Seufer Verlag, Keltern-Weiler. 254 pp. [presents general breeding data]
- Moschny, D. 2009. Haltung und Nachzucht von *Varanus cumingi* (Martin, 1838). *Varanus* 1(1): 8–20. [describes successful reproduction]
- Niekisch, M. 2010. The history of reptiles and amphibians at Frankfurt Zoo. Bonn Zoological Bulletin 57(2): 347–357. [mentions successful breeding at Frankfurt Zoo]
- Schildger, B.-J., H. Tenhu, M. Kramer, M. Gerwing, G. Kuchling, G. Thompson & R. Wicker. 1999. Diagnostic imaging of the reproductive tract in monitors: Radiology-ultrasonography-coelioscopy. Pp. 193–211. In: Horn, H.-G. & W. Böhme (eds.), Advances in Monitor Research II, Mertensiella 11. Deutsche Gesellschaft für Herpetologie und Terrarienkunde e.V., Rheinbach [describes veterinary techniques in reproductive management]
- Vogel, D. 1994. Erstmalige Nachzucht des Mindanao-Bindenwarans (*Varanus* [*Varanus*] *salvator cumingi*) im Zoologischen Garten Frankfurt/Main. Monitor 3(1):41. [documents successful reproduction at Frankfurt Zoo]
- Wicker, R., M. Gaulke & H.-G. Horn. 1999. Contributions to the biology, keeping and breeding of the Mindanao water monitor (*Varanus s. cumingi*). Pp. 213–223. 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 reproduction at Frankfurt Zoo]
- Yuyek, M.D. 2012. Husbandry and reproduction of *Varanus olivaceus* Hallowell (Sauria: Varanidae) at the Aylon Montalban Zoological Park. Biawak 6(1): 39–53. [mentions egg laying and unsuccessful incubation]
- Ziegler, T. & A. Rauhaus. 2017. *Varanus cumingi* hatch at Cologne Zoo. Biawak 11(1): 7. [documents successful reproduction at Cologne Zoo]



Varanus cumingi. Captive. Photographed by John Ad-ragna.