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Multiple Generations, Multiple Clutches, and Early Maturity in Four Species of Monitor Lizards (Varanidae) Bred in Captivity

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We report on the successful reproduction of four species of monitor lizard (*Varanus glauerti*, *V. kingorum*, *V. pilbarensis*, and *V. caudolineatus*) maintained by the senior author. All are currently assigned to the subgenus *Odatria* (King and Green 1999). There are no previous literature reports of captive breeding of these species. All species are housed under the same conditions. The animals are kept in pairs or trios in enclosures approximately 130 x 60 x 80 cm (L x W x H), with 30-cm deep substrate (loam and grit), and stacked boards to provide hiding places. Water is added to the substrate in sufficient quantities to ensure that the lower levels are always moist. Temperatures in the enclosures range between 28°C and 66°C, maintained 24 hours a day. Heat is provided by spotlights and heating mats. The animals are fed crickets of various sizes dusted with a 3:1 by volume mix of Rep-Cal® and Herptivite® and small mice. Food is provided generously.

Initial copulations are observed more or less continuously over three to five days. Prior to production of subsequent clutches the mating period is shorter (about 24 h). Throughout the mating period the pair stay in close contact. Eggs are buried in the substrate, usually at night (despite the 24 h light cycle). They are removed immediately and incubated in a 1:1 mixture by weight of perlite and water. Initially clutches were incubated at a constant 30.6°C. Under these conditions eggs of all species hatched after 90–100 days (exceptionally 65–110 days). Subsequently, incubation temperatures were allowed to fluctuate between 28.5°C and 32.5°C. Incubation times for individual species under these conditions are given below.

Varanus kingorum has been maintained since 1993. During this time six generations of captive animals have been produced. Clutch size is typically two but as many as six eggs have been laid. Up to 14 clutches of eggs have been produced by a single female in as many months. Incubation takes 65–80 days under the conditions described above. Hatchlings have a total length of about 15 cm. Both sexes become sexually mature at four months of age. Males are removed from enclosures after egg laying to allow females to regain condition.

Since 1996 *V. glauerti* have produced a total of five generations of captive bred animals. Females produce up to 68 fertile eggs in

eight clutches over eight months; eggs hatch after 90–110 days. Average clutch size is nine with a maximum of 12 eggs. Hatchlings measure approximately 18 cm total length and can reach maturity at around seven months of age. Males are separated from females after egg laying.

Since 1997 three generations of *V. pilbarensis* have been produced. Clutch size averages four eggs, with a maximum of six. Up to six clutches are produced per year, usually laid two weeks apart over 2–3 months followed by a pause of nine months. Eggs typically hatch after 80 days, sometimes as quickly as 65 days. Hatchlings measure approximately 13 cm total length and can reach sexual maturity as early as eight months of age. It has not been necessary to separate sexes after egg laying because females regain condition rapidly.

Three generations of *V. caudolineatus* have been produced since 1997. Typically 5–6 clutches of eggs are produced over four months, followed by an eight month pause. Clutch sizes of 2–3 eggs are common, however a maximum of five eggs have been laid. The eggs hatch between 65 and 80 days and reach sexual maturity at the age of five months. It has not been necessary to separate sexes after egg laying.

Although multiple clutches have been recorded many times in captive monitor lizards (Card 1994; Horn and Visser 1990, 1997; Vincent and Wilson 1999) and occasionally in wild populations (Shine et al. 1996), the numbers of clutches reported here are much higher than those previously reported for any captive monitor lizard. Similarly, the ages at maturity reported here are much lower than those in the literature. The results suggest that, given conditions of almost unlimited access to food and heat, these lizards are capable of much higher rates of growth and reproduction than had been previously supposed. They further suggest a capacity for rates of metabolism that are at present undocumented.

LITERATURE CITED

- CARD, W. 1994. Double clutching Gould's monitors (*Varanus gouldii*) and Gray's monitors (*V. olivaceus*) at the Dallas Zoo. *Herpetol. Rev.* 25:111–114.
- HORN, H. G., AND G. J. VISSER. 1990. Review of reproduction of monitor lizards (*Varanus* spp.) in captivity. *Int. Zoo Yrbk.* 28:140–150.
- _____, AND _____. 1997. Review of reproduction of monitor lizards (*Varanus* spp.) in captivity II. *Int. Zoo Yrbk.* 35:227–246.
- KING, D., AND B. GREEN. 1999. *Monitors. The Biology of Varanid Lizards*. Krieger Publ. Co., Malabar, Florida. 116 pp.
- SHINE, R., P. S. HARLOW, J. S. KEOGH, AND BOEADI. 1996. Commercial harvesting of giant lizards: The biology of water monitors *Varanus salvator* in southern Sumatra. *Biol. Conserv.* 77:125–134.
- VINCENT, M., AND S. WILSON. 1999. *Australian Goannas*. New Holland Publishers, Frenchs Forest, New South Wales. 152 pp.