

**Reproductive Senescence of the Neotropical Rattlesnake,
Crotalus durissus cascavella (Serpentes: Viperidae)**

Selma Maria Almeida-Santos and Maria da Graça Salomão*
Laboratório de Herpetologia
Instituto Butantan
Av. Vital Brasil, 1500, Butantã,
São Paulo, 05503-900, SP
Brazil

The information regarding the maintenance of pitvipers in captivity is relatively scanty (Murphy and Armstrong, 1978). Captive maintenance of rattlesnakes has been an interest of Instituto Butantan because of the use of rattlesnake venom in serotherapy. Since the founding of the institute in 1901, many colonies of venomous snakes have been kept for breeding and extraction of venom, but to date the relationships between age and senescence of venom or reproductive ability have not been established. Some species show high levels of adaptability, and longevity records of 10 years are not uncommon (Murphy and Armstrong, 1978). A male *Crotalus horridus* lived 36 years in captivity and exhibited signs of senescence, such as inability to kill its prey and difficulty with digestion, from the age of 25 (Cavanaugh, 1994). Evidence about the reproductive status of aging snakes, either male or female, is inconclusive (Patnaik, 1994), but the consensus is that the initiation of secondary vitellogenesis, usually a response to environmental cues (Fitch, 1970: 212-213), can be lost in captivity (Aldridge, 1979).

This work reports on the reproductive stage of a female *Crotalus durissus cascavella* (snout-vent length 123.0 cm; tail length 7.0 cm; weight 1645 g; 16 rattle segments), captured in the state of Ceara, northeastern Brazil (5°00 S; 40°00 W) and brought to Instituto Butantan. After 29 years in captivity (20-27°C; under natural photoperiod regime; fed on mice or rats every 20 days; without any signs of senescence), in the month of April (austral autumn), the snake was found dead. Dissection showed the presence of 14 and 9 follicles in the

right and left ovaries respectively (10-16 mm) in secondary vitellogenesis. The snake was then preserved and deposited in the museum collection "Alphonse Richard Hoge," I.B. 54627. Observations of rattlesnakes (*C. d. terrificus*) of both sexes kept together in captivity, in the state of São Paulo, southeastern Brazil (22°00 S; 49°00 W), showed that females could reproduce until the age of 28, exhibiting a biennial cycle and producing normal offspring (Cais, pers. com.).

The above data confirm that *C. d. cascavella* maintained its natural reproductive cycle, similar to *C. d. terrificus*, which shows mating and secondary vitellogenesis in autumn, ovulation in spring and birth in summer as described by Almeida-Santos and Salomão (1997). Lira-da-Silva et al. (1994) also recorded birth of *C. d. cascavella* in summer, corroborating our findings. These reproductive events show the same pattern observed in closely related rattlesnakes from the temperate region, particularly the North American rattlesnake. Therefore, Neotropical rattlesnakes seem to present slow senescence, not only based on continuous growth, but also based on the ability of aging individuals to reproduce.

Acknowledgements

We thank Prof. Dr. Arif Cais, head of the Department of Zoology, Universidade Estadual Paulista (UNESP), São José do Rio Preto, SP, Brazil, for the information on *Crotalus durissus terrificus*; Jairo Mendes de Souza and Valdir José Germano, Laboratório de Herpetologia, Instituto Butantan, for technical support in the bioterium activities.

Literature Cited

- Aldridge, R. D. 1979. Female reproductive cycles of the snakes *Arizona elegans* and *Crotalus viridis*. *Herpetologica* 35(3):256-261.
- Almeida-Santos, S. M., and M. G. Salomão. 1997. Long-term sperm storage in the Neotropical rattlesnake *Crotalus durissus terrificus* (Viperidae: Crotalinae). *Jpn. J. Herpetol.* 17:46-52.
- Cavanaugh, C. J. 1994. *Crotalus horridus* (Timber rattlesnake). Longevity. *Herpetological Review* 25:70.
- Fitch, H. S. 1970. Reproductive cycles in lizards and snakes. *Univ. Kansas Mus. Nat. Hist. Misc. Publ.* 52:1-247.
- Lira-da-Silva, R. J., L. Casais-e-Silva, I. B. Queiroz and T. B. Nunes. 1994. Contribuição à biologia de serpentes da Bahia, Brasil. I. vivíparas. *Revta. Bras. Zool.* 11:187-193.
- Murphy, J. B., and B. L. Armstrong. 1978. Maintenance of rattlesnakes in captivity. *Univ. Kansas Mus. Nat. Hist. Spec. Public.* 3:1-40.
- Patnaik, B. K. 1994. Ageing in reptiles. *Gerontology* 40:201-220.

* to whom correspondence should be addressed