

## Geographical Distribution and Natural History Notes on *Python bivittatus* in Thailand

Michael Cota

*Natural History Museum, National Science Museum, Thailand,  
Technopolis, Khlong 5, Khlong Luang, Pathum Thani 12120 Thailand*

### INTRODUCTION

Because of its large size, *Python bivittatus* is poorly represented as vouchered specimens in scientific collections. Consequently, few published locality data are available for this species, so accurately depicting its geographic distribution, particularly latitudinal, longitudinal, and elevational, is problematic. Likewise, as an ambush predator with secretive habits and cryptic colouration, it is not commonly encountered and is, therefore, also poorly known from a natural history perspective. *P. bivittatus* was long given subspecific rank as a subspecies of *P. molurus* despite well documented isolated sympatry, as well as being morphologically and ethologically distinct; *P. bivittatus* and *P. molurus* appear to also be ecologically distinct.

### Geographic Distribution

Although documenting the distribution of *Python bivittatus* has been neglected over most of its native range, its invasive species status in the south-eastern United States has stimulated a series of papers concerning its potential for range expansion in North America (Rodda *et al.*, 2008 including; Pyron *et al.*, 2008; Reed and Rodda, 2009), as well as its native geographical distribution (Barker and Barker, 2008; Pyron *et al.*, 2008; Rodda *et al.*, 2008

Reed and Rodda, 2009). Cox (1991) reported its range as all provinces north of Chumphon; the Chumphon locality was based on an unpublished record of a personal observation (Cox, pers. comm.), but was not stated in any of the literature. Rodda *et al.* (2008) reported the distribution of *P. bivittatus* to be continuous from Northern Thailand and ending at the Isthmus of Kra, implied by Cox *et al.* (1998). Likewise, Barker and Barker (2008) stated the recorded geographical distribution of this species to the south ending at Chumphon, as implied by Cox (1991). Pyron *et al.* (2008) erroneously depicted a continuous distribution through peninsular Thailand to peninsular Malaysia that resulted from a misreading of one of their sources (Nabhitabhata and Chan-ard, 2005) (Pyron pers. comm.). Reed and Rodda (2009) reported its distribution south to the Isthmus of Kra. Jacobs *et al.* (2009) also report its southernmost distribution to the Isthmus of Kra. To date, the southernmost exact locality in Thailand was given by Pauwels *et al.* (2003) as Kraeng Krachan District and National Park, Phetchaburi Province, which is far north of the Isthmus of Kra.

On 9 October 2009, a road kill *Python bivittatus* on Highway 4 in the Hua Hin District of Prachuap Khiri Khan Province, Thailand (12° 29' 48.9"-N 99° 53' 16.4"-E 35m) was found by the author, L. Lee Grismer, Jesse L.

---

\* Corresponding author.  
E-mail : herpetoge@gmail.com

Grismer, Perry L. Wood, Jr. Robert E. Espinoza and Travis Hagey (Figure 1) This represents the southernmost documented exact locality for peninsular Thailand for this species and the only exact locality in peninsular Thailand other than those in Phetchaburi Province recorded by Pauwels *et al.* (2003). This record, together with one from Surat Thani Province (Nabhitabhata and Chan-ard, 2005; Nabhitabhata pers. comm.), those of Pauwels *et al.* (2003) and unpublished records of Cox (pers. comm.) now record a continuous distribution of *P. bivittatus* extending south along peninsular Thailand to Surat Thani Province. Nabhitabhata's personal comment on a provincial record for *P. bivittatus* in Surat Thani represents a southernmost continuous distribution to the south of the Isthmus of Kra. The occurrence of *P. bivittatus* in peninsular Thailand should be considered rare at best, given the lack of historical records and earlier doubt whether it existed there (Boulenger, 1912). Smith (1943) went further to say that there were no authentic records for peninsular Siam (peninsular Thailand).

Previously published records of *Python bivittatus* in Thailand are scarce (Table 1). There are no previously published records of this species on the Khorat Plateau of Northeastern Thailand (Isaan). There are two localities recorded in the mountainous regions that form the border of Isaan, at Phu Luang, Loei (Chan-ard *et al.*, 1999; Nabhitabhata *et al.*, 2000; Nabhitabhata and Chan-ard, 2005) and Khao Yai National Park, Pak Chong District, Nakhon Ratchasima (Derwanz, 2005); however, there are no published locality records in Northeast Thailand, even though this species is generally considered to occur throughout this region (Cox *et al.*, 1998; Barker and Barker, 2008; Pyron *et al.*, 2008; Rodda *et al.*, 2008; Reed and Rodda, 2009). Cox (1991) recorded that the first albino *P. bivittatus* originated from Northeast Thailand, but no locality is given. Herein are the first records of localities for *P. bivittatus* from the Khorat Plateau (identifications of photo vouchers confirmed by Tanya Chan-ard). Nakhon Ratchasima

Province, Non Daeng District latitude, longitude and elevation not available (this study, Figure 2).

Udon Thani Province, Muang District. 17° 18' 56" – N 102° 39' 29" – E 227 m. (Figure 3).

Bangkok, Buriram, Chaiyaphum, Chiang Mai, Kanchanaburi, Lampang, Maha Sarakham, Nan, Nonthaburi, Phitsanulok, Phrae, Ranong and Surin represent provincial records (Cox unpubl. records).

Although these localities do not represent a significant improvement of our understanding of the range of *Python bivittatus*, this may stimulate others to publish additional records, which would lead to a more complete picture of the distribution of this taxon throughout its range (Figure 6).

The elevational distribution of *Python bivittatus* has been rarely recorded. Localities such as Siracha, Chon Buri (Smith, 1914a), Rangsit District, Pathum Thani Province (Nabhitabhata *et al.*, 2000; Nabhitabhata and Chan-ard, 2005) and Khlong Luang District, Pathum Thani Province (14° 03' 39" – N 100° 38' 57" – E 4 m) (Cota pers. observ.) and vouchered specimen THNHM 10327 from Khlong Luang District, Pathum Thani Province are near sea level. In Thailand, the highest elevation recorded for this species is 850 m from Phu Luang National Park, Loei Province (Chan-ard *et al.*, 1999). Cox *et al.* (1998) gave a maximum elevation of 900 m for this species, but they did not provide locality data and this probably represents a rounding up of Chan-ard's 850 m record that was not yet published at that time (Cox pers. comm.). Based on review of literature, the highest elevation for this species found was a record of 1,200 m by Orlov *et al.* (2000) in a bamboo forest of the Tam-Dao Mountain Range of Vietnam. Rodda *et al.* (2008) reported a considerably higher elevation of ~2400 m citing Wall (1912) (Reed pers. comm.); however, based on the vague



**Table 1.** Localities of *Python bivittatus* in Thailand, published and from this study.

Province	District/National Park	Source
Tak		Nabhitabhata <i>et al.</i> (2000)
Lop Buri		Nabhitabhata <i>et al.</i> (2000)
Petchabun	Nam Nao	Taylor (1965)
Loei	Phu Luang	Chan-ard <i>et al.</i> (1999)
Nakhon Sawan	Tak Li	Nabhitabhata <i>et al.</i> (2000)
Pathum Thani	Rangsit	Nabhitabhata and Chan-ard (2005)
Pathum Thani	Khlong Luang	This study
Prachin Buri	Prachantakham	Nabhitabhata <i>et al.</i> (2000)
Nakhon Nayok	Ongkarak	Nabhitabhata <i>et al.</i> (2000)
Chachoensao	Khao Ang Rue Ni	Nabhitabhata <i>et al.</i> (2000)
Chon Buri	Siracha	Nabhitabhata <i>et al.</i> (2000)
Uthai Thani	Huay Khakhaeng	Chan-ard <i>et al.</i> (1999)
Uthai Thani	Khao Nang Rum (ca. 450 m)	Round pers. comm.
Phetchaburi	Kaeng Krachan	Pauwels <i>et al.</i> (2003)
Phetchaburi	Muang	Pauwels <i>et al.</i> (2003)
Surat Thani		Nabhitabhata and Chan-ard (2005); Nabhitabhata pers. comm.
Udon Thani	Muang	This study
Prachuap Khiri Khan	Hua Hin	This study
Nakhon Ratchasima	Non Daeng	This study
Nakhon Ratchasima	Pak Chong	Derwanz (2005)
Nakhon Ratchasima	Wang Nam Kieo	Round pers. comm.
Samut Prakarn	Bang Bo	Meewattana unpubl. record.
Buriram		Cox unpubl. record
Chaiyaphum		Cox unpubl. record
Chiang Mai		Cox unpubl. record
Chumphon		Cox (1991) by implication; Cox pers. observ.
Kanchanaburi		Cox unpubl. record
Lampang		Cox unpubl. record
Maha Sarakham		Cox unpubl. record.
Nan		Cox unpubl. record
Nonthaburi		Cox unpubl. record
Phitsanulok		Cox unpubl. record
Phrae		Cox unpubl. record
Ranong		Cox unpubl. record
Rayong		Cox unpubl. record
Surin		Cox unpubl. record

regional information given (foothills of the Himalayas), this pertained to *P. molurus*. High elevations given by Reed and Rodda (2009) of 2,500 + m (Whitaker, 1993; Murphy and Henderson, 1997), 2,400 m (Ernst and Zug, 1996) and 2,000 m (Whitaker, 1978; Kabisch, 2002; Whitaker and Captain, 2004; Khan, 2006) all represent areas within the geographical distribution of *P. molurus* either directly or referenced from earlier publications, not for *P. bivittatus*. A record of 1,600 m Reed and Rodda (2009) cites Pope (1935), but this was an error; Pope (1935) gives a maximum elevation for *P. bivittatus* of 1,500 feet, which is only ca. 457 m. If this was in reference to Pope (1935) citing Wall's (1921) 6,000 feet, this is ca. 1,829 m and Pope (1935) also states that Wall did not recognise the difference between *molurus* and *bivittatus*; that this record applies to *P. bivittatus* is highly speculative and without evidence.

### Natural History Notes

Despite its large adult size, the cryptic colouration and reclusive behaviour of *Python bivittatus* make it an enigmatic taxon. Just as locality data are lacking for this species, so is knowledge of its natural history. In Thailand, this species is found in sympatry with *Broghammerus reticulatus*. In Khlong Luang District of Pathum Thani Province (14° 03' 39"–N 100° 38' 57"–E 4 m) (Cota unpl. record), the two species occur not only in sympatry, but syntopically, albeit not temporally; these two species were found within a few meters of each other at this location within weeks of time. Within a kilometre of this area, which consisted of seasonally flooded swamps with high grass, broken up with trees, both species were found throughout this same habitat; although *B. reticulatus* was occasionally seen in trees, both species were usually found in the same microhabitat: on the ground in high grass with trees offering shade, as was the case at the coordinates provided (Cota pers. observ.). It is likely that these two large snakes, which also have similar diets (Cox, 1991; Shine *et al.*, 1999;

Reed and Rodda, 2009), may partition their niches behaviourally. Whereas *P. bivittatus* is primarily an ambush predator (Cota pers. observ.), depending on cryptic colouration (Figure 4), *B. reticulatus* appears to actively forage (Reed and Rodda, 2009; Cox pers. comm.; Cota pers. observ.), possibly using water to silently approach prey (Auliya, 2003) (Figure 5).

Although far more common in forested and agricultural areas, *Python bivittatus* may be encountered in suburban neighbourhoods, but does not occur in urban environments, unlike *Broghammerus reticulatus*, which historically to the present is well established in the middle of Bangkok (Smith, 1914a; Cox, 1991; Cota, pers. observ.).

*Python molurus* can be found in xeric habitats, based on habitat and areas listed in Reed and Rodda (2009); however, *P. bivittatus* prefers more mesic or hydric habitats with constant availability of water (Barker and Barker, 2008; Reed and Rodda, 2009; Cota pers. observ.). In numerous surveys conducted by the Thailand Natural History Museum from 2006 to 2008, concentrating on montane forests, as well as historical records, not a single specimen of *P. bivittatus* has been recorded in montane forests of Thailand. *P. molurus* has been recorded in montane forests (Reed and Rodda, 2009). There is no existing record of *Python bivittatus* in montane forest anywhere in its range. Such differences in habitat as implied by Reed and Rodda (2009) from localities and this study appear to support a clear ecological difference between these two species, which reinforces the specific rank given to *P. bivittatus* by Jacobs *et al.* (2009) on the basis of isolated sympatry (O'Shea, 2007; Barker and Barker, 2008), great morphological differences and ethological differences that have been historically documented (Werner, 1909; Mertens, 1930). The most obvious and consistently seen morphological difference is the presence of a row of suboculars in *P. bivittatus* not present





**Figure 1.** *Python bivittatus* at Hua Hin District, Prachuap Khiri Khan Province (THNHMDPC 091022-001).



**Figure 2.** *Python bivittatus* at Non Daeng District, Nakhon Ratchasima Province (THNHMDPC 090131-001).





**Figure 3.** *Python bivittatus* at Muang District, Udon Thani Province (THNHMDPC 091116-001).



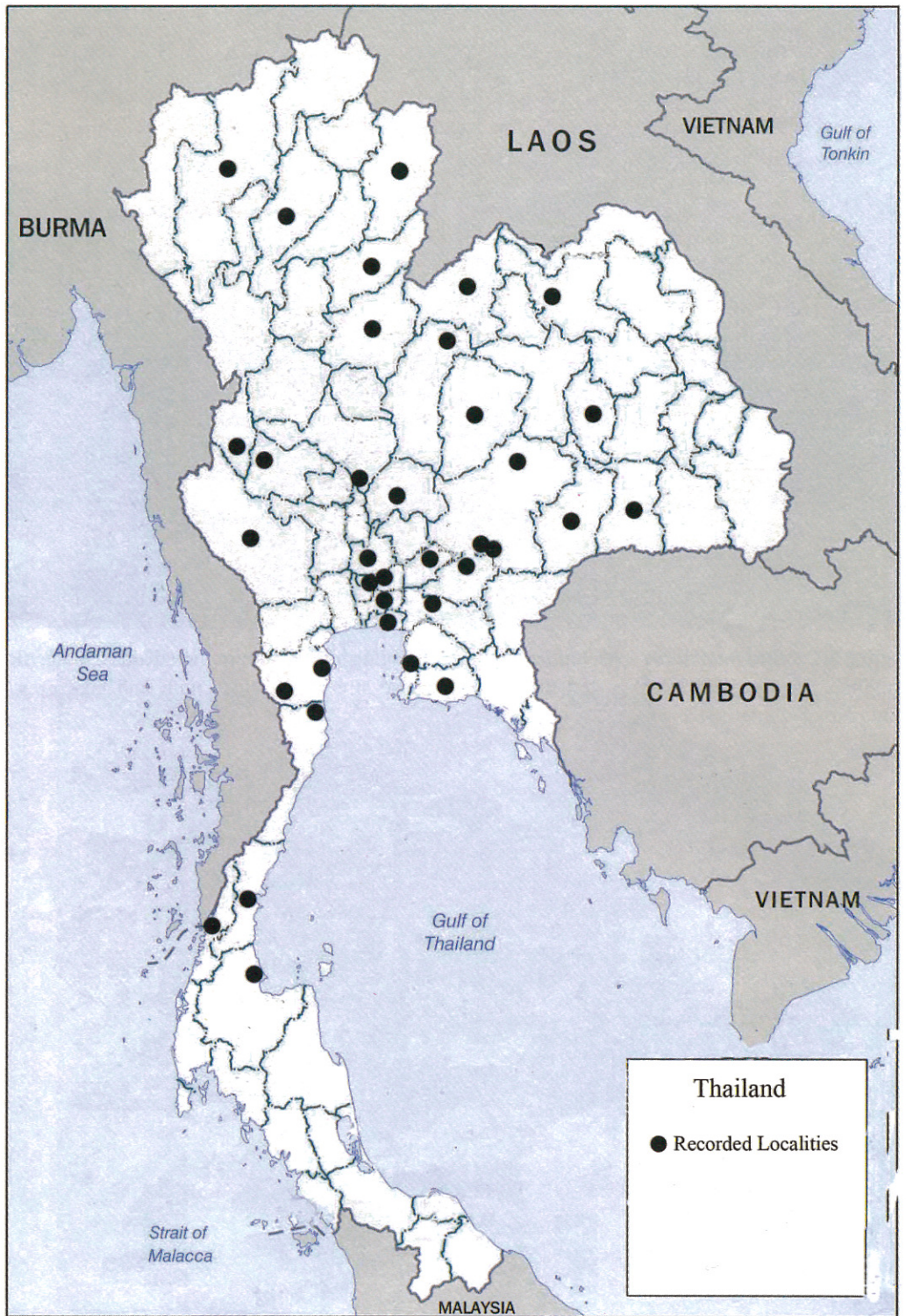
**Figure 4.** Specimen from Khlong Luang District, Pathum Thani. Cryptic colouration gives *Python bivittatus* a distinct advantage when waiting to ambush prey (THNHMDPC 081210-001).





**Figure 5.** *Broghammerus reticulatus* actively foraging in a stream, on Koh Chang, Trat Province. Auliya (2003) suggested that they may use streams to close with and take prey to minimise being detected.





**Figure 6.** Map: Geographical Distribution of *Python bivittatus* with published localities and localities from this study. Provincial records are placed in the middle of the centre of the province, the provincial capital or most likely location found.



in *P. molurus* where the 7th labial extends up to eye (Werner, 1909; de Rooij, 1917).

### ACKNOWLEDGEMENTS

The author would like to thank Merel J. Cox for his valuable personal observations on geographic distribution and natural history, along with his numerous unpublished locality records. Additionally, the author would like to thank L. Lee Grismer, Jesse L. Grismer, Perry L. Wood Jr., Robert E. Espinoza and Travis Hagey for their invitation and field support which allowed the recent Prachuap Khiri Khan locality observation. The author would also like to thank Pratheep Meewattana and Philip Round for additional unpublished locality data.

### REFERENCES

- Auliya, M.A. 2003. *Taxonomy, Life History and Conservation of Giant Reptiles in West Kalimantan*. Natur und Tier Verlag. Münster, Germany. 432 p.
- Barker, D.G. and T.M. Barker. 2008. The Distribution of the Burmese *Python*, *Python molurus bivittatus*. *Bulletin of the Chicago Herpetological Society*. 43(3): 33-38.
- Boulenger, G.A. 1912. *A Vertebrate Fauna of the Malay Peninsula*. Taylor and Francis. London. 294 pp.
- Chan-ard, T., W. Grossmann, A. Gumprecht and K.-D. Schulz. 1999. *Amphibians and Reptiles of Peninsular Malaysia and Thailand*. Bushmaster Publications. Würselen, Germany. 240 p.
- Cox, M.J. 1991. *The Snakes of Thailand and Their Husbandry*. Krieger Publishing. Malabar, Florida, USA. 526 pp.
- Cox, M.J., P.P. van Dijk, J. Nabhitabhata and K. Thirakhupt. 1998. *A Photographic Guide to Snakes and Other Reptiles of Thailand and Southeast Asia*. Asia Books. Bangkok, Thailand. 144 p.
- de Rooij, N. 1917. The Reptiles of the Indo-Australian Archipelago. II Ophidia. E.J. Brill. Leiden, The Netherlands. 331 p.
- Derwanz, K. 2005. Thailand, Dschungelabenteuer Khao Yai. Opferkuch GmbH, Aalen, Germany. 269 p.
- Ernst, C.H. and G.R. Zug. 1996. *Snakes in question*. Smithsonian Institution. Washington, D.C., USA. 203 p.
- Jacobs, H.J., M. Auliya and W. Böhme. 2009. Zur Taxonomie des Dunklen Tigerpythons, *Python molurus bivittatus* Kuhl, 1820, speziell der Population von Sulawesi. *Sauria*. 31(3): 5-16.
- Kabisch, K. 2002. Family Boidae, in H.H. Schleich and W. Kästle (eds.), *Amphibians and Reptiles of Nepal*. A.R.G. Gantner Verlag K.G. Ruggell, Germany. 785-802.
- Khan, M.S. 2006. *A Guide to the Reptiles of Pakistan*. Krieger Publications. Melbourne, Florida, USA. 311 p.
- Mertens, R. 1930. Die Amphibien und Reptilien der Inseln Bali, Lombok, Sumbawa und Flores. *Abhandlungen der senckenbergischen naturforschenden Gesellschaft*. 42(3): 115-344.
- Murphy, J.C. and R.W. Henderson. 1997. Tales of giant snakes: a natural history of anacondas and pythons. Krieger Publications. Malabar, Florida, USA. 221 p.
- Nabhitabhata, J. and T. Chan-ard. 2005. *Thailand Red Data: Mammals, Reptiles and Amphibians*. Office of Natural Resources and Environmental Policy and Planning. Bangkok, Thailand. 234 p.
- Nabhitabhata, J., T. Chan-ard and Y. Chuaynkern. 2000. *Checklist of Amphibians and Reptiles in Thailand*. Office of Environmental Policy and Planning. Bangkok, Thailand. 152 p.
- O'Shea, M. 2007. *Boas and Pythons of the World*. Princeton University Press. Princeton and Oxford. 160 pp.
- Orlov, N.L., R.W. Murphy and T.J. Papenfuss. 2000. List of snakes of Tam-Dao Mountain Range (Tonkin, Vietnam). *Russian Journal of Herpetology*. 7(3): 69-80.

- Pauwels, O.S.G., P. David, C. Chimsunchart and K.Thirakhupt. 2003. Reptiles of Phetchaburi Province, Western Thailand: a list of species, with natural history notes and a discussion of the biogeography at the Isthmus of Kra. *Natural History Journal of Chulalongkorn University*. 3(1): 25-53.
- Pope, C.H. 1935. The Reptiles of China: Turtles, Crocodylians, Snakes, Lizards. *Natural History of Central Asia*. Volume 10. American Museum of Natural History. 604 p.
- Pyron, R.A., F.T. Burbrink and T.J. Guiher. 2008. Claims of potential expansion throughout the U.S. by invasive python species are contradicted by ecological niche models. *PLoS ONE* 3(8):e2931. doi:10.1371/journal.pone.0002931.
- Reed, R.N. and G.H. Rodda. 2009. Giant constrictors: biological and management profiles and an establishment risk assessment for nine large species of pythons, anacondas, and the boa constrictor. US. Geological Survey Open-File Report 2009-1202. 302 p.
- Rodda, G.H., C.S. Jarnevich and R.N. Reed. 2008. What parts of the US mainland are climatically suitable for invasive alien pythons spreading from Everglades National Park? *Biological Invasions*. DOI 10.1007/s10530-008-9228-z.
- Shine, R., Ambariyanto, Harlow, P.S. and Mumpuni. 1999. Reticulated pythons in Sumatra: biology, harvesting and sustainability. *Biological Conservation* 87: 349-357.
- Smith, M. A. 1914a. The snakes of Bangkok. *Natural History Bulletin of the Siam Society* 1: 5-18.
- Smith, M. A. 1943. The Fauna of British India, Ceylon and Burma, Including the Whole of the Indo-Chinese Sub-region. Reptilia and Amphibia. Vol. III.-Serpentes. Taylor and Francis, London. 583 p.
- Stoliczka, F. 1870. Observations on some Indian Amphibia and Reptilia. *Journal of the Asiatic Society*. Bengal. 205 p.
- Taylor, E.H. 1965. The serpents of Thailand and adjacent waters. *University of Kansas Science Bulletin*. 45(9): 609-1096.
- Wall, F. 1912. A popular treatise on the common Indian snakes. *Journal of the Bombay Natural History Society*. 21: 447-476.
- Wall, F. 1921. Ophidia Taprobanica or the Snakes of Ceylon. H.R. Cottle, Colombo. 581 p.
- Werner, F. 1909. Neue oder seltene Reptilien aus dem Musée d'Histoire naturelle de Belgique in Brüssel. *Zool. Jahresbuch Abt. Syst.* 28: 263-279.
- Whitaker, R. 1978. Common Indian Snakes: a Field Guide. Macmillan India. Delhi, India, 154 p.
- Whitaker, R. 1993. Population status of the Indian Python (*Python molurus*) on the Indian subcontinent. *Herpetological Natural History*. 5(1): 87-89.
- Whitaker, R. and A. Captain. 2004. Snakes of India. The Field Guide. Draco Books. Chengalpattu, Tamil Nadu, India. 481 p.