



<http://dx.doi.org/10.11646/zootaxa.3948.2.3>

<http://zoobank.org/urn:lsid:zoobank.org:pub:064A12F0-5742-4828-8D26-85AD7B226091>

## On the taxonomic status of the Thai endemic freshwater snake *Parahelicops boonsongi*, with the erection of a new genus (Squamata: Natricidae)

PATRICK DAVID<sup>1</sup>, OLIVIER S. G. PAUWELS<sup>2</sup>, TRUONG QUANG NGUYEN<sup>3</sup> & GERNOT VOGEL<sup>4</sup>

<sup>1</sup>Reptiles & Amphibiens, UMR 7205 OSEB, Département Évolution et Systématique, CP 30, Muséum National d'Histoire Naturelle, 57 rue Cuvier, F-75231 Paris Cedex 05, France. E-mail: [pdavid@mnhn.fr](mailto:pdavid@mnhn.fr)

<sup>2</sup>Département des Vertébrés Récents, Institut Royal des Sciences Naturelles de Belgique, Rue Vautier 29, B-1000 Brussels, Belgium. E-mail: [osgpauwels@yahoo.fr](mailto:osgpauwels@yahoo.fr)

<sup>3</sup>Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Hanoi, Vietnam. E-mail: [nqt2@yahoo.com](mailto:nqt2@yahoo.com)

<sup>4</sup>Society for Southeast Asian Herpetology, Im Sand 3, D-69115 Heidelberg, Germany. E-mail: [Gernot.Vogel@t-online.de](mailto:Gernot.Vogel@t-online.de)

### Abstract

*Parahelicops boonsongi* Taylor & Elbel, 1958 is known from only three specimens from Thailand. It has been placed either in the genus *Parahelicops* Bourret, 1934, along with *Parahelicops annamensis* Bourret, 1934, or in the genus *Opisthotropis* Günther, 1872. We compared its morphological characters with those of *P. annamensis* and with three other relevant genera, *Opisthotropis*, *Pararhabdophis* Bourret, 1934, and *Paratapinophis* Angel, 1929. *Parahelicops boonsongi* is phenotypically distinct from *Parahelicops annamensis*, *Opisthotropis*, and all other natricine genera. We consequently erect a new genus, *Isanophis* gen. nov., to accommodate *Parahelicops boonsongi*.

**Key words:** Serpentes, Natricidae, *Parahelicops*, *Parahelicops annamensis*, *Isanophis* gen. nov., *Opisthotropis*, *Pararhabdophis*, *Paratapinophis*

### Introduction

Several species of the snake fauna of the Indochinese region, including Thailand, are still known only from their holotype or type series, or at best a handful of specimens. For instance, *Paratapinophis praemaxillaris* Angel, 1929, has been known from two syntypes from northern Laos, and six other specimens from China and Thailand (Mo *et al.* 1984, Murphy *et al.* 2008). Two other natricine species, *Pararhabdophis chapaensis* Bourret, 1934 and *Parahelicops annamensis* Bourret, 1934, were previously also known from their respective holotypes. However, Stuart (2006) described a second specimen of *Parahelicops annamensis*, from Laos. Currently, following intensive fieldwork in northern Vietnam and Laos, both *Parahelicops annamensis* and *Pararhabdophis chapaensis* are known from about 10 specimens each (unpublished data; see Appendix).

Another rare species, *Parahelicops boonsongi* Taylor & Elbel, 1958 was described on the basis of a single specimen from Loei Province in northeastern Thailand. Subsequently, Cox (1995) recorded two additional specimens, also from Loei Province. Taylor & Elbel (1958) referred their new species to the genus *Parahelicops* Bourret, 1934 because of some morphological similarities with *P. annamensis*, such as the single prefrontal. However, the generic status of *Parahelicops* has been controversial nearly since its description. It was established by Bourret (1934b: 170 [separate: p. 6]) for a new species, *Parahelicops annamensis* Bourret, 1934, on the basis of a single specimen with the following characters: 25 subequal maxillary teeth, the last two enlarged (in fact we counted 26+2 teeth on the same specimen); head quite distinct from the neck; eye small with a round pupil; nostrils directed upwards; two internasals, a single prefrontal; elongated body, slightly laterally compressed; dorsal scales keeled, without apical pits, in 15 rows; tail long; subcaudals paired; hypapophyses developed throughout the vertebral column. Bourret (1934b) further commented that this genus was similar to *Opisthotropis* Günther, 1872 but differed by its dentition, its head distinct from the neck and its elongated body.

Alan Resetar (FMNH), Canh Xuan Le and Thai Huy Tran (IEBR), Alain Dubois, Ivan Ineich and Annemarie Ohler (MNHN), Bryan L. Stuart (NCSM), Heinz Grillitsch, Silke Schweiger and Richard Gemel (NMW), Pim Arntzen and Ronald de Rooter (RMNH), Tanya Chan-ard and Michael Cota (THNHM), Tao Thien Nguyen (VNMN), Dennis Rödder and Wolfgang Böhme (ZFMK), Natalia Ananjeva and Nikolai Orlov (ZISP), Mark-Oliver Rödel and Frank Tillack (ZMB), Frank Glaw and Michael Franzen (ZSM).

Research of Truong Q. Nguyen is funded by the Alexander von Humboldt Foundation (VIE 1143441).

## Literature cited

- Angel, F. (1929) Liste des Reptiles et Batraciens du Haut-Laos recueillis par M. Delacour. Description d'un genre, de deux espèces et d'une variété d'Ophidiens. *Bulletin du Muséum d'Histoire Naturelle*, Série 2, 1 (1), 75–81. [Paris]
- Boulenger, G.A. (1893) *Catalogue of the snakes in the British Museum (Natural History). Vol. I. containing the families Typhlopidae, Glauconiidae, Boidae, Ilysiidae, Uropeltidae, Xenopeltidae, and Colubridae Aglyphae, part.* British Museum of Natural History, London, xiii + 448 pp., pls. 1–28.
- Bourret, R. (1934a) Notes herpétologiques sur l'Indochine française. I. Ophidiens de Chapa. *Bulletin général de l'Instruction Publique*, 13<sup>e</sup> Année (7, March), 129–138. [separate reprint: 1–10]
- Bourret, R. (1934b) Notes herpétologiques sur l'Indochine française. III. Ophidiens d'Annam et du Moyen Laos. *Bulletin général de l'Instruction Publique*, 13<sup>e</sup> Année (9, May), 167–176. [separate reprint: 3–12]
- Bourret, R. (1936) *Les Serpents de l'Indochine. Tome II. Catalogue systématique descriptif.* Henri Basuyau et Cie, Toulouse, 505 pp.
- Brown, W.C. & Leviton, A.E. (1961) Discovery of the snake genus *Opisthotropis* in the Philippine Islands, with description of a new species. *Occasional Papers of the Natural History Museum of Stanford University*, 8, 1–5.
- Chan-ard, T., Grossmann, W., Gumprecht, A. & Schulz, K.-D. (1999) *Amphibians and Reptiles of Peninsular Malaysia and Thailand. An illustrated checklist – Amphibien und Reptilien der Halbinsel Malaysia und Thailand. Eine illustrierte Checkliste.* Bushmaster Publications, Würselen, 240 pp. [Germany]
- Cox, M.J. (1991) *The snakes of Thailand and their husbandry.* Krieger Publishing Co., Malabar (Florida), xxx + 526 pp.
- Cox, M.J. (1995) *Opisthotropis boonsongi* (Boonsong's Stream Snake). *Herpetological Review*, 26 (3), 157.
- Cox, M.J., Hoover, M.F., Chanhom, L. & Thirakhupt, K. (2012) *The snakes of Thailand.* Chulalongkorn University Museum of Natural History, Bangkok, xx + 844 pp.
- Cox, M.J., Van Dijk, P.P., Nabhitabhata, J. & Thirakhupt, K. (1998) *A photographic guide to Snake and others reptiles of Peninsular Malaysia, Singapore and Thailand.* Ralph Curtis Books, Sanibel Island, Florida, 1–144.
- David, P., Agarwal, I., Athreya, R., Mathew, R., Vogel, G. & Mistry, A. (2015) Revalidation of *Natrix clerki* Wall, 1925, an overlooked species in the genus *Amphiesma* Duméril, Bibron & Duméril, 1854 (Squamata: Natricidae). *Zootaxa*, 3919 (2), 375–395.  
<http://dx.doi.org/10.11646/zootaxa.3919.2.9>
- David, P., Bain, R.H., Nguyen, Q.T., Orlov, N.L., Vogel, G., Vu, N.T. & Ziegler, T. (2007) A new species of the natricine snake genus *Amphiesma* from the Indochinese Region (Squamata: Colubridae: Natricinae). *Zootaxa*, 1462, 41–60.
- David, P., Pham, C.T., Nguyen, T.Q. & Ziegler, T. (2011) A new species of the genus *Opisthotropis* Günther, 1872 (Squamata: Natricidae) from the highlands of Kon Tum Province, Vietnam. *Zootaxa*, 2758, 43–56.
- David, P. & Vogel, G. (2010) A new species of the natricine snake genus *Amphiesma* from Borneo (Squamata: Natricidae). *Russian Journal of Herpetology*, 17 (2), 121–127.
- David, P., Vogel, G. & Van Rooijen, J. (2013) On some taxonomically confused species of the genus *Amphiesma* Duméril, Bibron & Duméril, 1854 related to *Amphiesma khasiense* (Boulenger, 1890) (Squamata, Natricidae). *Zootaxa*, 3694 (4), 301–335.  
<http://dx.doi.org/10.11646/zootaxa.3694.4.1>
- Deuve, J. (1970) Serpents du Laos. *Mémoires de l'O.R.S.T.O.M.*, Paris, 39, 1–251.
- Dowling, H.G. (1951) A proposed standard system of counting ventrals in snakes. *British Journal of Herpetology*, 1 (5), 97–99.
- Duméril, A.-M.-C., Bibron, G. & Duméril, A. (1854a) *Erpétologie générale ou histoire naturelle complète des reptiles. Tome septième. Première partie, comprenant l'histoire des serpents non venimeux.* Librairie Encyclopédique de Roret, Paris, xvi + 780 pp.
- Fitzinger, L.J.F.J. (1843) *Systema reptilium. Fasciculus primus. Amblyglossae.* Braumüller & Seidel Bibliopolas, Vindobonae [Vienna], 106 + ix pp.
- Günther, A.C.L.G. (1864) *The reptiles of British India.* Ray Society, London, xxvii + 452 pp., pls. 1–26.
- Günther, A.C.L.G. (1872) Seventh account of new species of snakes in the collection of the British Museum. *Annals and Magazine of Natural History*, Series 4, 9 (1), 13–37, pls. 3–6.
- Günther, A.C.L.G. (1875) Second report on collection of Indian reptiles obtained by the British Museum. *Proceedings of the Zoological Society of London*, 1875 (March), 224–234, pls. 30–34.
- Malnate, E.V. (1960) Systematic division and evolution of the colubrid snake genus *Natrix*, with comments on the subfamily

- Natricinae. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 112 (3), 41–71.
- Malnate, E.V. & Underwood, G. (1988) Australasian natricine snakes of the genus *Tropidonophis*. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 140 (1), 59–201.
- Mo, D.S., Chen, H.J. & Li, F.L. (1984) *Opisthotropis premaxillaris* (Angel), a record new to China. *Acta Herpetologica Sinica*, 3(1), 28. [in Chinese]
- Murphy, J.C., Chan-ard, T., Mekchai, S., Cota, M. & Voris, H.K. (2008) The Rediscovery of Angel's Stream Snake, *Paratatinophis praemaxillaris* Angel, 1929 (Reptilia: Serpentes: Natricidae). *The Natural History Journal of Chulalongkorn University*, 8 (2), 169–183.
- Nguyen, S.V. & Ho, C.T. (1996) *Danh luc bo sat va ech nhai Viet Nam*. Nha Xuat Ban Khoa Hoc va ky Thuat, Hanoi, 264 pp. [in Vietnamese, **note**: translation: *A checklist of the reptiles and amphibians of Vietnam*.
- Nguyen, S.V., Ho, C.T. & Nguyen, T.Q. (2005). *Danh Luc ech nhai va bo sat Viet Nam – A checklist of amphibians and reptiles of Vietnam*. Nha Xuat Ban Nong Nghiep, Hanoi, 180 pp. [in Vietnamese]
- Nguyen, S.V., Ho, C.T. & Nguyen, T.Q. (2009) *Herpetofauna of Vietnam*. Edition Chimaira, Frankfurt am Main, 768 pp.
- Pope, C.H. (1935) *The reptiles of China. Turtles, crocodilians, snakes, lizards*. American Museum of Natural History, New York, *Natural History of Central Asia*, X, i–xliv + 1–604, pls. 1–27.
- Rasmussen, J.B. (1982) A new record of the rare *Opisthotropis praemaxillaris* (Serpentes: Colubridae). *Amphibia-Reptilia*, 3 (2), 279–289.  
<http://dx.doi.org/10.1163/156853882X00491>
- Rossmann, D.A. & Eberle, W.G. (1977) Partition of the genus *Natrix*, with preliminary observations on evolutionary trends in natricine snakes. *Herpetologica*, 33 (1), 34–43.
- Smith, M.A. (1940) The amphibians and reptiles obtained by Mr. Ronald Kaulback in Upper Burma. *Records of the Indian Museum*, 42 (3), 465–486, pl. 8.
- Smith, M.A. (1943) *The fauna of British India, Ceylon and Burma, including the whole of the Indo-chinese subregion. Reptilia and Amphibia. Vol. III. Serpentes*. Taylor & Francis, London, xii + 583 pp.
- Stuart, B.L. (2006) A second specimen of *Parahelicops annamensis* Bourret, 1934 (Serpentes: Colubridae: Natricinae). *Hamadryad*, 30 (1–2), 167–171.
- Stuart, B.L. & Chuaynkern, Y. (2007) A new *Opisthotropis* (Serpentes: Colubridae: Natricinae) from Northeastern Thailand. *Current Herpetology*, 26 (1), 35–40.  
[http://dx.doi.org/10.3105/1345-5834\(2007\)26\[35:ANOSCN\]2.0.CO;2](http://dx.doi.org/10.3105/1345-5834(2007)26[35:ANOSCN]2.0.CO;2)
- Taylor, E.H. (1965) The serpents of Thailand and adjacent waters. *University of Kansas Science Bulletin*, 45 (9), 609–1096.
- Taylor, E.H. & Elbel, R.E. (1958) Contribution to the herpetology of Thailand. *University of Kansas Science Bulletin*, 38 (2), 1033–1189.
- Teynié, A., Lottier, A., David, P., Nguyen, T.Q. & Vogel, G. (2014a) A new species of the genus *Opisthotropis* Günther, 1872 from northern Laos (Squamata: Natricidae). *Zootaxa*, 3774 (2), 165–182.  
<http://dx.doi.org/10.11646/zootaxa.3774.2.4>
- Teynié, A., Nguyen, T.Q., Lorvelec, O., Piquet, A., Lottier, A. & David, P. (2014b) Amphibiens et Reptiles du Laos: nouvelles données nationales et provinciales. *Bulletin de la Société Herpétologique de France*, 151 (1), 21–52.
- Wall, F. (1910) A new *Tropidonotus* from the Chin Hills. *Journal of the Bombay Natural History Society*, 20 (2), 345–346.
- Wallach, V., Williams, K.L. & Boundy, J. (2014) *Snakes of the world. A catalogue of living and extinct species*. CRC Press, Boca Raton (Florida), xxvii + 1209 pp.  
<http://dx.doi.org/10.1201/b16901>
- Yang, J.-H., Wang, Y.-Y., Zhang, B., Lau, M.W.-N. & Chou, W.-H. (2011) Revision of the diagnostic characters of *Opisthotropis maculosa* Stuart and Chuaynkern, 2007 with notes on its distribution and variation, and a key to the genus *Opisthotropis* (Squamata: Natricidae). *Zootaxa*, 2785, 61–68.
- Ziegler, T., David, P. & Vu, N.T. (2008) A new natricine snake of the genus *Opisthotropis* from Tam Dao, Vinh Phuc Province, northern Vietnam (Squamata, Colubridae). *Zoosystematics and Evolution*, 84 (2), 197–203.  
<http://dx.doi.org/10.1002/zoos.200800004>

#### APPENDIX. List of additional examined specimens.

- Opisthotropis atra* (n = 1). “West Africa”. BMNH 1946.1.15.31 (holotype), no locality.
- Opisthotropis andersoni* (n = 1). China. FMNH 71136, “Hong Kong, Hong Kong Island, 950 ft.”
- Opisthotropis balteata* (n = 5). Vietnam. Bac Giang Province. IEBR A.0861, ZFMK 94229, Tay Yen Tu Nature Reserve, Son Dong District. North Vietnam. NMW 22979, “Tonkin”.—Cambodia. NMW 22978:1–2, no locality.
- Opisthotropis cucae* (n = 1). Vietnam. Kon Tum Province. IEBR A.0924 (holotype), Chu Mom Ray National Park, Sa Thay District, (14°26.227'N, 107°43.268'E), 740 m.
- Opisthotropis daovantieni* (n = 3). Vietnam. Gai Lai Province. FMNH 252009 (holotype), Buon Luoi village, 14°20'N 108°36'E, Kannack town, 20 km to the northwest from Kannack, Annam mountains, Ankhe District, 700–750m; FMNH 252008 (paratype), Buon Luoi village, Kannack town, 14°20'N–108°36'E, 20 km to the northwest from Kannack, Annam