

First record of the Yunnan Keelback *Sinonatrix yunnanensis* RAO & YANG, 1998 (Serpentes: Natricidae) from Thailand

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Abstract. The aquatic natricid snake *Sinonatrix yunnanensis*, so far known only from Yunnan Province, China, is recorded for the first time from Thailand based on a specimen from Chiang Rai Province, extending the species' known distribution more than 370 airline kilometers southwards. This addition brings the number of Thai natricid species to 21 and of Thai snake species to 192. Morphological and ecological data are provided for the new specimen.

Key words. Reptilia, Natricidae, *Sinonatrix yunnanensis*, freshwater, Chiang Rai Province, Thailand.

Introduction

The genus *Sinonatrix* ROSSMAN & EBERLE, 1977 (type species *Tropidonotus annularis* HALLOWELL, 1856, by original designation) currently includes four largely aquatic species: *Sinonatrix annularis* (HALLOWELL, 1856), *S. aequifasciata* (BARBOUR, 1908), *S. percarinata* (BOULENGER, 1899) and *S. yunnanensis* RAO & YANG, 1998 (MALNATE & UNDERWOOD 1988; RAO & YANG 1998). These species mostly inhabit China, although *Sinonatrix percarinata* ranges from northern Myanmar to eastern China, to northern Vietnam and northern Thailand. *Sinonatrix yunnanensis* was described from the Chinese province of Yunnan, where it was recorded from Jingdong, Menglian, Yongde, Jinggu and Lufeng counties. Quite surprisingly, ZHAO (2006) did not even mention this species in his opus on the snakes of China.

In April 2008, one of us (KK) collected an adult *Sinonatrix yunnanensis* at 6 km SW of Ban Pa Miang Mae Hang (X: 534000, Y: 2124300, UTM Zone 47), Moo. 7, Tambon (= Subdistrict) Pagnew, Wieng Pa Pao District, Chiang Rai Province, northern Thailand. The locality is situated at ca. 1200 m asl. The

species was not recorded so far from Thailand (see CHANHOM & PAUWELS, 2007). Herein, we provide a detailed morphological description of the first recorded Thai specimen.

Material and methods

Our identification is based on external morphological and coloration characters. Ventral scales were counted according to DOWLING's (1951) method, and are preceded by the number of preventrals (scales anterior to the ventrals, wider than long, but not in contact with the first dorsal scale row). The terminal tail scute is not included in the subcaudal count. Paired meristic characters are given in the left/right order. Sex was determined by dissection of the base of the tail. Besides the data available in the literature, we examined as comparative material one Vietnamese *Sinonatrix aequifasciata* (see VOGEL et al., 2004) and six Thai *S. trianguligera* (listed in PAUWELS & CHAN-ARD, 2006: 102 and CHANHOM et al., 2001), not repeated here. Systematic classification follows VIDAL et al. (2007).

Results

The female Thai specimen of *Sinonatrix yunnanensis*, now housed in the herpetological collections of the Queen Saovabha Memorial Institute, Thai Red Cross, Bangkok (under the collection number QSMI 544), was found in a fast-flowing, clear, rocky stream bordered by bamboo forest and dense secondary forest, 6 km SW of the closest village. Two other conspecific specimens, a smaller one and a bigger one, were seen at the same time in the same stream, but they were fast and could not be caught. At the time they were encountered, around 10 p.m., they were all actively foraging. Local Thai villagers from Ban Pa Miang Mae Hang called them *ngoo-kin-pla*, which means fish-eating snake. QSMI 544 was kept in a large vivarium for two months before being preserved for morphological study. During its captivity it was constantly in the water. It was fed small Cichlidae (*pla-nin*) and, although the snake was shy and was never seen feeding, the fish were disappearing, so it is clear it fed on these fishes. The snake was nervous and fiercely biting when handled.

QSMI 544 (see Figs 1-3) has a snout-vent length of 75.0 cm and a tail length of 23.5 cm, thus a total length of 98.5 cm. It shows the following characters: greenish eye with round black pupil; 1/1 preocular; 3/3 postoculars; 1/1 loreal; 1/1 supraocular; 9/8 supralabials of which the fourth and fifth are in contact on each side with the eye; 12/12 infralabials whose first five are in contact with the anterior pair of sublinguals; 2/2 anterior temporals; 1 preventral + 155 ventral scales; divided anal scale; 72 subcaudals, all divided. The dorsal scales are strongly keeled, except the two lowest rows. The ventrals and subcaudals are smooth. The dorsum background color is grayish olive with regularly spaced symmetric black marks showing an X-shape in lateral view. There is a total of 38 X marks on the whole body and tail, all clearly contrasted, including the posteriormost ones at the end of the tail. Upper branches of the left and right X of each band join on the middle of the back. In between the X marks the color is whitish-beige, same as the ventrum and tail underside background color. The lower branches of the left and right X are sometimes ventrally connected, especially in the posterior part



Fig. 1. Live adult *Sinonatrix yunnanensis* from Ban Pa Miang Mae Hang, Chiang Rai Province, northern Thailand. Photo: O.S.G. PAUWELS.



Fig. 2. Live adult *Sinonatrix yunnanensis* from Ban Pa Miang Mae Hang, Chiang Rai Province, northern Thailand. Close-up of head. Photo: O.S.G. PAUWELS.

of the body and under the tail. The maximal width of the X branches is about the length of two dorsal scales. The lateral distance between two X marks (at the X intersection level) is 3-4 dorsal scale lengths. The upper part of head, supralabials excluded, is uniformly grayish olive. The supralabials and lower part of the head are yellowish, gradually turning to the ventrum color on the throat. The Thai specimen agrees in all respects with the definition of *Sinonatrix yunnanensis* given by RAO & YANG (1998).

Discussion

The only other *Sinonatrix* species showing a X-mark dorsal pattern is *S. aequifasciata*, probably the most closely related phylogenetically to *S. yunnanensis*. *Sinonatrix aequifasciata* has a slightly lower ventral number (140-154 versus 156-165, according to RAO & YANG 1998 and VOGEL et al. 2004). Our ventral scales count distinguishes preventrals and ventrals (1 + 155, respectively), according to DOWLING's (1951) method, and thus corresponds to 156 ventral scales when DOWLING's method is not applied, giving a number of 156 ventrals using the way RAO & YANG (1998) counted them, thus within the known variation interval for *S. yunnanensis*. Moreover, the dorsal patterns of both species differ. In *Sinonatrix aequifasciata*, the lateral dis-



Fig. 3. Preserved adult *Sinonatrix yunnanensis* from Ban Pa Miang Mae Hang, Chiang Rai Province, northern Thailand. Ventral view. Photo: K. KUNYA.

tance between two X marks at their intersection level is generally 5-6 dorsal scale lengths (RAO & YANG 1998: 71; see also published pictures of Chinese and Vietnamese specimens in KARSEN et al. 1998: 134 and VOGEL et al. 2004: 112), *contra* 3-4 in *S. yunnanensis* as stated by RAO & YANG (1998) and as is also visible on the Thai specimen. While *Sinonatrix yunnanensis* was so far known only from Yunnan Province in southwestern China, *S. aequifasciata* is more widely distributed, in southwestern and southern People's Republic of China from Sichuan to Zhejiang and Hainan provinces, in central Lao PDR and northern Vietnam (STUART 1999: 60; VOGEL et al. 2004). Several of the known localities for *S. yunnanensis* are situated close to Myanmar (see localities listed by RAO & YANG 1998), including the southernmost ones, in Menglian County, which are about 370 air-line km north of the new Thai locality. The occurrence of this species in northern Thailand and Yunnan Province undoubtedly implies its occurrence in northwestern Laos and eastern Myanmar. ZUG et al. (2003) listed *Sinonatrix yunnanensis* from Myanmar, but

without any detail on locality, morphology or a reference to a voucher specimen. The present Thai record is the first documented one outside China, making that *Sinonatrix yunnanensis* is no longer a Chinese endemic snake.

Conclusion

With the recent addition of *Amphiesma bitaeniatum* (WALL, 1925) by DAVID & PAUWELS (2000), *A. khasiense* by CHANHOME et al. (2001), *Xenochrophis punctulatus* (GÜNTHER, 1858) by PAUWELS et al. (2001), the description of *Opisthotropis maculosus* by STUART & CHUAYNKERN (2007) and the present addition of *Sinonatrix yunnanensis*, the herpetofauna of Thailand is currently known to include a total of 21 natricid species (one being represented by two subspecies), distributed in seven genera. These are *Amphiesma bitaeniatum*, *A. deschauenseei* (TAYLOR, 1934), *A. groundwateri* (SMITH, 1921), *A. inas* (LAIDLAW, 1901), *A. khasiense* (BOULENGER, 1890), *A. stolatum* (LINNAEUS, 1758), *Macropisthodon flaviceps* (DUMÉRIL, BIBRON & DUMÉRIL, 1854), *M. rhodomelas* (BOIE, 1827), *Opisthotropis maculosus*, *O. praemaxillaris* (ANGEL, 1929), *O. spenceri* SMITH, 1918, *Parahelicops boonsongi* TAYLOR & ELBEL, 1958, *Rhabdophis chrysargos* (SCHLEGEL, 1837), *R. nigrocinctus* (BLYTH, 1855), *R. subminiatus subminiatus* (SCHLEGEL, 1837), *R. s. helleri* (SCHMIDT, 1925), *Sinonatrix percarinata percarinata* (BOULENGER, 1899), *S. yunnanensis*, *Xenochrophis flavipunctatus* (HALLOWELL, 1860), *X. piscator* (SCHNEIDER, 1799), *X. punctulatus* and *X. trianguligerus* (BOIE, 1827). According to the most recent list of Thai snakes available (CHANHOME & PAUWELS, 2007), *Sinonatrix yunnanensis* is the 192nd snake species recorded so far from the Kingdom of Thailand. Following the names provided for the Thai natricids by CHANHOME & PAUWELS (2007) and COX (1991: 484), we suggest for it the Thai common name *ngoo-lai-saw-Yunnan*.

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