

On the occurrence of *Amphiesma bitaeniatum* (WALL, 1925) in Vietnam, with preliminary remarks on the group of *Amphiesma parallelum* (BOULENGER, 1890) (Serpentes, Colubridae, Natricinae)

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Abstract. A specimen of the natricine *Amphiesma bitaeniatum* was recently collected near Sapa, northern Vietnam. This specimen confirms the occurrence of this species in Vietnam, first mentioned by POPE in 1935 on the basis of a specimen from Mt. Fan Si Pan, subsequently overlooked by other authors. Both specimens are described and compared with other preserved specimens. *Amphiesma bitaeniatum* is now known from Myanmar, China, Vietnam and Thailand. This species is compared with *Amphiesma parallelum* and *Amphiesma octolineatum*. Main differences in pattern and coloration are discussed, and a key to the species similar to *A. bitaeniatum* is provided.

Key words. Serpentes: Colubridae: *Amphiesma bitaeniatum*, *Amphiesma octolineatum*, *Amphiesma parallelum*; Vietnam.

Introduction

The Asian genus *Amphiesma* DUMÉRIL, BIBRON & DUMÉRIL, 1854 is currently composed of 39 species (DAVID & DAS 2003), but its content is still provisional. It should be modified shortly due to the discovery of yet undescribed taxa (see, for example, ZIEGLER 2002: 219) and the re-evaluation of the status of currently recognized species. During a herpetological survey in the region of Sapa, Province of Lào Cai, Vietnam, the second author obtained a snake that we identified as *Amphiesma bitaeniatum* (WALL, 1925). This species was originally described as *Natrix bitaeniata* by WALL (1925: 806; type locality: "Kutkai, North Shan States, Burma: 6000 feet", now Kutkai, Shan State, Myanmar). However, the specimen from Sapa is not the first one to have been recorded from Vietnam. POPE (1935: 100) briefly cited (as *Natrix bitaeniata*), without description, a specimen of *Amphiesma bitaeniatum* collected on "Fan-Si-Pan, Lao Kay, Tongking", now Mt. Phang Si Pang, Binh Thuân Province

(BMNH 1930.11.16.5). This record was largely overlooked by subsequent authors or was cited as *Amphiesma parallelum* (BOULENGER, 1890), as for example by NGUYÊN & HÔ (1996).

Amphiesma bitaeniatum was tentatively included by MALNATE (1960) in an informal subgroup also including *Amphiesma parallelum* and *Amphiesma octolineatum* (BOULENGER, 1904). These species from the Eastern Himalayas and neighbouring areas are characterized by a distinctly longitudinally striped pattern and are morphologically very similar. As an obvious consequence, their identification is rather difficult, and the confusion among these species has long been extensive in the literature. The present paper is only the first step, emphasizing the diagnostic characters of these three species, towards a more comprehensive study of species related to *Amphiesma parallelum*.

We describe these two Vietnamese specimens of *Amphiesma bitaeniatum*, and compare them to preserved specimens from Myanmar and China, and with data from the

literature. Two other species, relatively similar in morphology, *Amphiesma platyceps* (BLYTH, 1854) and *Amphiesma sieboldii* (GÜNTHER, 1860), are also discussed, as they have been confused with *Amphiesma parallelum*. Lastly, *Amphiesma bitaeniatum* has also been largely confused with *Amphiesma octolineatum* and *Amphiesma metusia* INGER, ZHAO, SHAFFER & WU, 1990. On the basis of recently collected specimens and the investigation of characters not considered by previous authors, we provide an artificial key to these six rather similar species.

Materials and methods

This study is based on the examination of 96 specimens referred to the species *Amphiesma bitaeniatum*, *Amphiesma octolineatum*, *Amphiesma parallelum*, *Amphiesma metusia*, *Amphiesma platyceps* and *Amphiesma sieboldii*. Examined specimens are listed in the Appendix. Investigated characters are discussed below. All measurements are in millimetres (mm). Body and tail lengths were measured to the nearest millimetre. All other measurements were taken with a slide-calliper to the nearest 0.1 mm. Ventral scales were counted according to DOWLING (1951). The terminal scute is excluded from the number of subcaudals. The number of dorsal scale rows is given at one head length behind head, at midbody (i.e. at the level of the ventral plate corresponding to half of the total ventral number), and at one head length before vent, respectively. Values for symmetric head characters are given in left/right order.

Abbreviations used for measurements and meristic characters are: HDE: horizontal diameter of eye; HL: head length; LPr: length of prefrontal; RIn: ratio of width of anterior margin of internasals/posterior margin of internasals; SnL: snout length (distance between the snout tip and the anterior margin of the eyes); SVL: snout-vent length; TaL: tail length; TL: total length;

TaL/TL: ratio tail length / total length. DSR: dorsal scale rows; IL: infralabials; K1R: keeling of first DSR at midbody; KSR: keeling of dorsal scale rows at midbody; MSR: number of dorsal scale rows at midbody (see above); PoO: postoculars; PrO: preocular(s); PSR: number of dorsal scale rows before vent (see above); SC: subcaudals; SL: supralabials; Te: temporals; VEN: ventrals.

Museum abbreviations used are as follows: AMNH, American Museum of Natural History, New York; BMNH, British Museum (Natural History), London; CAS, California Academy of Sciences, San Francisco; CIB, Chengdu Institute of Biology, Academia Sinica, Chengdu; FMNH, The Field Museum, formerly the Field Museum of Natural History, Chicago; KSC, Kohima Science College, Kohima; MHNG, Muséum d'Histoire Naturelle, Geneva; MNHN, Muséum National d'Histoire Naturelle, Paris; NRCT, National Research Council of Thailand, Bangkok; SMNH, Shanghai Museum of Natural History, Shanghai; ZSI/ERS, Zoological Survey of India (Eastern Region Station), Shillong.

Results

Description of Vietnamese specimens

BMNH 1930.11.16.5, an adult female from "Fan-Si-Pan, Lao Kay, Tongking", now Mt. Phang Si Pang, Binh Thuân Province, collected by DELACOUR & LOWE. MNHN 1999.9090 (Figs. 1-4), an adult female, from the vicinity of Sapa, Lào Cai Province, at about 1800 m a.s.l., collected in June 1998 by G. VOGEL. The latter specimen was collected in a rocky area covered with bushes and single trees, under cool and cloudy weather conditions. In the following description, the first and second values given for each character refer to those of BMNH 1930.11.16.5 and MNHN 1999.9090, respectively. Unless otherwise mentioned, the state or value of a given character is shared by both specimens.



Fig. 1. Dorsal view of *Amphiesma bitaeniatum* (MNHN 1999.9090) from the vicinity of Sapa, Lào Cai Province, Vietnam (specimen freshly killed by forest workers).



Fig. 2. Close-up view of *Amphiesma bitaeniatum* (MNHN 1999.9090) from the vicinity of Sapa, Lào Cai Province, Vietnam.



Fig. 3. Ventral view of *Amphiesma bitaeniatum* (MNHN 1999.9090) from the vicinity of Sapa, Lào Cai Province, Vietnam.

Habitus: Body moderately elongated, cylindrical; head elongate, rather narrow, barely distinct from neck; snout long, accounting

for 24.3 and 26.6 % of HL respectively, 1.6 times as long as HDE, slightly flattened, narrowing up at its tip which is blunt when

seen from above, rounded seen from side, with no defined canthus rostralis; nostril lateral; eye large, its diameter 2.0 and 2.5 times the distance between its inferior margin and upper lip edge; pupil round; tail long, cylindrical and progressively tapering.

Dentitional morphology: Maxillary teeth (on the right side of head): BMNH 1930.11.16.5: 19 subequal + 2 distinctly enlarged teeth, without diastema. MNHN 1999.9090: 17 subequal + 2 distinctly enlarged teeth, without diastema.

Measurements and scalation: BMNH 1930.11.16.5: SVL 520 mm; TaL 188 mm; TL 708 mm. Ratio TaL/TL: 0.266. VEN: 166 (+ 2 preventrals); SC 86, all paired; anal divided. DSR 19-19-17, strongly keeled on the upper part of the back, less keeled on the lower rows, smooth on 1st DSR, all distinctly and deeply notched at their apical part, especially on the posterior part of the body. No apical pit. Dorsal scale row reductions: 19-17: right, 3+4 (VEN 99)/left, 3+4 (VEN 100). MNHN 1999.9090: SVL 494 mm; TaL 160 mm; TL 654 mm. Ratio TaL/TL: 0.245. VEN: 174 (+ 2 preventrals); SC 76, all paired; anal divided. DSR 19-19-17, more or less strongly keeled on the upper part of the back, less keeled on the lower rows, smooth on first DSR, all distinctly and deeply notched at their apical part, especially on the posterior part of the body. No apical pit. Dorsal scale row reductions: 19-17: right, 3+4 (VEN 100)/left, 3+4 (VEN 100). Rostral 1.6 times as wide as high; nasal rectangular, longer than high, divided into two parts, with a lateral nostril piercing between the two parts of the nasal; internasals subtriangular, slightly longer than wide, anteriorly narrowed but truncated with RIn about 0.60; suture of parietals about 0.8 time as long as frontal; frontal ogive-shaped, 1.5 and 1.7 times as long as wide; prefrontals barely longer than internasals and wider, reaching loreal; one large, undivided supraocular on each side; one subrectangular loreal, slightly longer than high; 8/8 SL in both specimens, 1st-2nd SL in con-

tact with nasals, 2nd-3rd SL in contact with loreal, 3rd-5th SL entering orbit (no subocular), 7th SL largest; 1/1 PrO; 3/3 PoO; 2+1/2+1 Te and 1+1/1+1 Te respectively; 10/10 IL in both specimens.

Coloration: BMNH 1930.11.16.5: In alcohol, dorsal surfaces are dark brownish grey above (DSR 8-10 before VEN 100, 7-9 behind), pale beige brown on the sides, distinctly paler than on the back, with many scales of both the sides and the back edged with blackish-brown. The vertebral row is distinctly paler than adjacent scales. A conspicuous pale yellow-ochre dorsolateral stripe extends on 5th, 6th and 7th DSR (4th, 5th, 6th respectively behind VEN 100), bordered below with a well defined, single, blackish-brown line on upper half of DSR 4 and lower part of DSR 5, and above by a thinner and fainter irregular, discontinuous blackish-brown line on the extreme upper part of DSR 7. The dorsolateral beige yellow stripe extends forwards on the neck and on upper side of the head where it distinctly widens and becomes paler and more conspicuous behind the upper temporals. The lower blackish-brown line widens significantly on the side of the neck and is connected without constriction to the black postocular streak, whereas the upper dark line extends forwards up to the occipital region, ending at the same level than the ivory dorsolateral stripe. Scales of DSR 1 marked with faint and irregular blackish-brown short streaks on their anterior margin, producing a very discontinuous zig-zag ventrolateral line. Upper tail surface as the body, the dark brown colour of the back and the ivory yellow stripe merging toward the end of the tail. The lower lateral blackish-brown stripe of the body and the ventrolateral zig-zag like line joins a short distance behind vent, and extends as a single blackish-brown up to the tail tip; the upper lateral stripe vanishes progressively a short distance behind vent. Head greyish-brown above, with weak vermiculations. Sides of snout slightly paler, pale yellowish-brown, without darker

streak in front of the eye. Supralabials pale ivory yellow; SL 1st to 5th spotted with dark brown. A conspicuous, broad dark brown postocular streak extending from behind the eye to the corner of the mouth, running on lower PoO, first temporal, upper part of SL 6 (creamy yellow bottom), centre of SL 7 and lower half of SL 8, scale on which it is rather irregular dark greyish-brown. Seventh supralabial is pale cream yellow on its lower part and greyish-brown, as upper head surface, on its upper part; SL 8 is yellowish-ochre on its upper part which belongs to the end of the dorsolateral stripe. The side of the neck is bright pale yellowish-ochre above, with a wide, blackish brown, continuous stripe in its middle part resulting from the continuity of the postocular streak which connects with the ochre-brown colour of the lower half of the body, and is ivory yellow on its lower part. Eye black. Venter creamy yellow, with, on each side of ventral scales, an elongated small dark brown spot near the outer margin of the scale at about 3/4 of the scale width. Chin and throat uniformly yellow, with few faint greyish-brown spots on the infralabials.

MNHN 1999.9090: In alcohol and life, dorsal surfaces are dark greyish-brown above (DSR 8-10 before VEN 100, 7-9 behind), pale ochre brown on the sides, distinctly paler than on the back, with a conspicuous ivory-yellow dorsolateral stripe running on DSR 5th, 6th and 7th (lower half) (4th, 5th, 6th respectively behind VEN 100), bordered below with a well defined, single, blackish-brown line on upper half of DSR 4 and extreme lower part of DSR 5, and above by a thinner and fainter irregular blackish-brown line on the extreme upper part of DSR 7 and lower part of DSR 8. The dorsolateral beige yellow stripe extends forwards on the neck and on upper side of the head where it widens slightly and becomes paler and more conspicuous behind the upper temporals. The lower blackish-brown line widens significantly on the side of the neck and is connected without constriction to the black postocular streak, whereas the upper dark

line extends forwards up to the occipital region, ending at the same level than the ivory dorsolateral stripe. Scales of DSR 1 marked with faint and irregular blackish-brown short streaks on their anterior margin, producing a discontinuous zig-zag ventrolateral line. Upper tail surface as the body, the dark brown colour of the back and the ivory yellow stripe merging toward the end of the tail. The lower lateral blackish-brown stripe of the body and the ventrolateral zig-zag like line joins a short distance behind vent, and extends as a single blackish-brown up to the tail tip; the upper lateral stripes vanish progressively a short distance behind vent. Head greyish-ochre above, with weak vermiculation, slightly paler, pale yellowish-brown on the snout side, but without any darker marking; background colour of supralabials bright yellow in life, pale ivory yellow in alcohol; SL 1-5 marked with thin blackish-brown sutures on their upper and posterior parts; a conspicuous dark brown postocular streak extending from behind the eye to the corner of the mouth, running on lower PoO, upper part of SL 6 (ivory yellow bottom) and centres of SL 7 and 8. These two supralabials are pale yellow on their lower part, SL 7 is greyish-ochre above, whereas SL 8 is ivory yellow on its upper part which belongs to the end of the dorsolateral stripe. The side of the neck is ivory yellow above, with a wide blackish brown and continuous stripe in its middle part resulting from the continuity of the postocular streak which connects with the ochre-brown colour of the lower half of the body, and is ivory yellow on its lower part. Eye black. Venter ivory yellow, with, on each ventral scale, an elongated small spot near at about 3/4 of the scale width. Chin and throat uniformly yellow, with few faint greyish-brown spots on the infralabials.

Discussion

Comparison with other species

We investigated the main morphological similarities and differences between *Amphies-*

ma bitaeniatum, *Amphiesma octolineatum* and *Amphiesma parallelum*, as well as between these taxa and the specimens from Vietnam. In this preliminary paper, we focus only on characters which allow an immediate identification of the species. Meristic data will be presented elsewhere (DAVID et al., in prep.). As a consequence, we retain here only the following characters: (1) background dorsal colour; (2) width of a lower black dorsolateral line (bordering the lower margin of the pale dorsolateral stripe); (3) width of the black ventrolateral stripe; (4) general appearance of the sides compared to the dorsum colour (paler/darker), resulting from the width of the lateral black stripes; (5) continuity of the postocular streak with the lower black dorsolateral stripe; (6) KSR; (7) K1R; (8) DSR notching (describes the apical part of dorsal scales. Scales can either show the normal, posteriorly pointed rhomboedric shape, or have the posterior part deeply notched). Another useful character is (9) dentitional morphology: presence or absence of a diastema between the enlarged posterior maxillary teeth and the anterior series of shorter teeth.

From these preliminary results, it appears that (see also the key provided below):

(A) Both Vietnamese specimens from Sapa and Mt. Phang Si Pang can be referred with confidence to *Amphiesma bitaeniatum*.

(B) *Amphiesma bitaeniatum* and *A. parallelum* are readily distinguishable, without intermediate patterns. They should be considered distinct species, which can be separated by constant differences in characters (4), (5), (7) and (9). The lattermost character, the dentitional morphology, and the dorsal tone are diagnostic. In *A. parallelum*, regardless of whether the specimens are light or dark, the general coloration of body (Character 4) is nearly identical on the back and the side, whereas in *A. bitaeniatum*, the upper dorsal surfaces are distinctly darker than the sides, namely the area below the dorsolateral stripe. The significance of the continuity or discontinuity of the postocular streak with the lateral black stripe of the body (Character

5), already noticed by WALL (1925), is confirmed. The combination of these two characters is usually sufficient to distinguish between the two taxa.

(C) *Amphiesma bitaeniatum* and *Amphiesma octolineatum* can be readily distinguished by differences in the characters (1), (2), (3), (4), (6), and (7). The most significant characters useful to separate these two species are characters (1; see Key), (2) and (3), as these lateral stripes are usually fused, or separated by a very thin yellowish line, leading to character (4), with the sides much darker than the upper surface of the body in *A. octolineatum*, (6) and (7), dorsal scales of *A. octolineatum* being only weakly keeled above, and totally smooth on the first DSR, whereas *A. bitaeniatum* is usually strongly keeled above, and more or less weakly keeled on the first DSR, and, lastly, (8), the dorsal scales of *A. octolineatum* being normal or at best barely notched posteriorly, whereas scales are usually strongly notched in *A. bitaeniatum*, especially on the posterior part of the body.

MALNATE (1960) recognized several informal groups and subgroups within the genus *Amphiesma*, subdivided into subgroups. One of them, based on similarities in the general dorsal patterns, included *Amphiesma parallelum*, *Amphiesma bitaeniatum* and *Amphiesma octolineatum*. The great morphological similarity between these three species led to extensive and often intricate confusion in the literature. For example, BOURRET (1936) and SMITH (1943) did not regard *Amphiesma bitaeniatum* as valid and placed it in the synonymy of *Amphiesma parallelum* (then known as *Natrix parallela*). Other taxa, such as *Natrix clerki* WALL, 1925, *Amphiesma metusia* INGER, ZHAO, SHAFER & WU, 1990 and *Tropidonotus parallelus sublaevis* DESPAX, 1913, currently regarded either as valid or as synonyms of one of the three species cited above, need to have their status re-evaluated. Their status will be discussed in a forthcoming paper, along with updated definitions, chresonymies and distributions of these species.

Distribution

The presence of *Amphiesma bitaeniatum* at Sapa and on Mt. Phang Si Pang (formerly Fan-si-pan), near the Chinese border, extends the range of the species eastwards from the previously southernmost confirmed station of the Chinese province of Yunnan (Xishu-angbanna). *Amphiesma bitaeniatum* has recently been discovered in northern Thailand, on the basis of a specimen depicted in CHANARD et al. (1999) and identified in DAVID & PAUWELS (2000). This specimen (NRCT 980506), which extends considerably southwards the range of *Amphiesma bitaeniatum*, will be discussed elsewhere. *Amphiesma bitaeniatum* has also recently been collected in the Chinese province of Guangxi (Cenwang-lao Shan, Tianlin County) (ANONYMOUS 2003). Thanks to the courtesy of MICHAEL W. LAU, we examined this specimen. Previously, in China, this species was known only from the province of Yunnan. Its occurrence in Guangxi, another province bordering Vietnam, makes it very likely that it will be discovered in other localities in northern Vietnam, Laos, and southern China in the future.

Amphiesma parallelum is only known with certainty from north-eastern India (states of Meghalaya, West Bengal and Arunachal Pradesh), northern Myanmar (northern Kachin State) and from the People's Republic of China, from where it has been definitely recorded only in extreme western Yunnan (CAS 215036). We also examined a typical specimen of *Amphiesma bitaeniatum* (CAS 215037) from a nearby locality. *Amphiesma parallelum* is the only one of the three species occurring in India, and has yet to be recorded farther east than extreme western Yunnan. Contrary to information appearing in several references, including GRUBER (2002), *Amphiesma parallelum* is not definitely known from Nepal. We examined many alleged specimens of *Amphiesma parallelum* from Nepal, and all proved to be referable to the complex *Amphiesma platyceps* /

Amphiesma sieboldii, as defined by MALNATE (1966). Only a single, old specimen collected by B. H. HODGSON (BMNH 58.6.24.5) and allegedly obtained in Nepal, is indeed an *Amphiesma parallelum*. We consider that KRAMER (1977) was correct in stating that no specimen of *Amphiesma parallelum* is known from Nepal with certainty. The same misidentification appears in ZHAO et al. (1998: 75), in which the three specimens cited from Xizang Province (China) as MVZ 177474 and MVZ 177672-673 (in fact a lapsus calami for CAS 177474, 177672 and 177673) are also referable to *Amphiesma sieboldii*. On the basis of these results, the two records of *Amphiesma parallelum* from northern Vietnam appearing in NGUYÊN & HÔ (1996) are referred to *Amphiesma bitaeniatum*. BOURRET (1939) did not mention *Amphiesma parallelum* from the montane stations of northern Vietnam, so he probably never encountered any species of the *Amphiesma parallelum* subgroup there. BOURRET (1934, 1936) reported *Amphiesma parallelum* from Cambodia (as *Natrix parallela parallela*), without precise locality. On the basis of his description, these specimens seem to be referable to *Amphiesma boulengeri* (GRESSITT 1937) (DAVID et al., unpublished).

The specimen from Nagaland, India (KSC 414) and a specimen from Myanmar (BMNH 1940.6.4.29) show some differences in pattern, scalation and dentition, and share several characters with the holotype of *Natrix clerki* WALL, 1925, which might prove to be a valid species, in contrast to SMITH'S (1943) synonymization with *Amphiesma parallelum*. This problem will be addressed in the next paper.

Lastly, *Amphiesma octolineatum* is still known only from the People's Republic of China, in the provinces of Yunnan, southern Sichuan, Guizhou and Guangxi Zhuang Autonomous Province (ZHAO et al. 1998). It most probably also occurs in Vietnam, Laos and western Myanmar. The status of several specimens from western Sichuan identified as *Amphiesma octolineatum* (for example in

ZHAO et al. 1998) will be discussed in DAVID & VOGEL (in prep.). The specimens recorded from Guangxi Zhuang by MO et al. (2002), collected at the same locality as a specimen of *Amphiesma bitaeniatum* examined for the

present paper, could not be examined by ourselves. The description suggests that the identification as *Amphiesma octolineatum* is correct.

Key to the species of the *parallelum*-subgroup

The three species considered above share a grey, greyish-brown, ochre brown or pale brown background, an overall striped pattern with at least a lighter, more or less distinct, black edged dorsolateral stripe, and 19-17 DSR. They can be separated, as well as the species *Amphiesma platyceps* and *A. sieboldii*, confused with *Amphiesma parallelum*, by the combination of the following characters (characters for *A. platyceps* and *A. sieboldii* drawn from MALNATE 1966 and specimens examined by us):

- 1 a. No dorsolateral stripe, or at best a row of white dots; a narrow, black or dark brown subocular and postocular streak; posterior maxillary teeth greatly and abruptly enlarged, twice as long as other maxillary teeth; at least 190 VEN 2
- 1 b. A distinct, broad, pale and continuous dorsolateral stripe from neck to the end of tail; a conspicuous, wide black or dark brown postocular streak; posterior maxillary teeth distinctly enlarged, but less than twice as long as other maxillary teeth; less than 178 VEN 3
- 2 a. Only upper dorsal scale rows moderately keeled, others smooth; 205-234 VEN in males, 191-216 VEN in females; dorsal surfaces usually marked with scattered black dots, without a dorsolateral series of white dots (or barely defined); venter usually immaculate; subcaudal surfaces usually immaculate, rarely darkened with grey *Amphiesma platyceps*
- 2 b. All dorsal scale rows (excepted 1st one) keeled; 191-207 VEN in males, 165-190 VEN in females; dorsal surfaces usually uniformly brown, excepted a dorsolateral series of well-defined small white spots; venter often largely speckled with dark greyish-brown posteriorly; subcaudal surface usually dark *Amphiesma sieboldii*
- 3 a. Enlarged posterior maxillary teeth separated from others by a distinct diastema; body sides and upper dorsal surface of same tone (not paler nor lighter); black postocular streak separated from lower body lateral black stripe by a gap, or barely in contact; a black preocular streak on preocular and loreal, sometimes short or faint, but nearly always present *Amphiesma parallelum*
- 3 b. Enlarged maxillary teeth not separated from others by a diastema; sides of body either distinctly paler or distinctly darker than upper dorsal surface; dark postocular streak in continuity with lower body lateral black stripe; no black preocular streak on preocular and loreal 4
- 4 a. Dorsal colour brown or ochre-brown; stripe bordered with two narrow black lines; sides paler than upper body, speckled with black but not marked with a low lateral black stripe; dorsal scales strongly keeled and deeply notched posteriorly *Amphiesma bitaeniatum*

- 4 b.** Dorsal colour grey or brownish-grey; stripe bordered below with one or two wide dark grey or dark brownish-grey stripes, making the side distinctly darker than upper body; dorsal scales smooth or weakly keeled, not or very slightly notched **5**
- 5 a.** Dorsal colour usually light grey or brownish-grey; dorsolateral stripe ending anteriorly in narrowing on the nape; stripe bordered with two dark stripes, the lower one, irregular, very wide; a narrow pale zig-zag-like line on upper part of DSR 1 *Amphiesma octolineatum*
- 5 b.** Dorsal colour grey or blackish-brown; dorsolateral stripe ending anteriorly in widening on the nape; dark brown or dark brownish-grey on the sides; no zig-zag line on upper part of DSR 1 *Amphiesma metusia*

Whereas some specimens, especially some of the darker representatives of *Amphiesma parallelum* and *Amphiesma octolineatum*, may be slightly different from the typical patterns given in this key, the combination of all characters allow a rather confident identification, including in long preserved animals.

Conclusions

Ascertaining the limits of the ranges of *Amphiesma parallelum* towards east, *A. bitaeniatum* towards west, and *A. octolineatum* towards east and south, respectively, requires the collection of more specimens from Northern Myanmar, China and Laos. The occurrence of *Amphiesma bitaeniatum* in northern Vietnam raises to eight the number of species of this genus in this country. According to the literature (NGUYÊN & HỒ 1996; ORLOV et al. 2000) and our data, Vietnam is inhabited by *Amphiesma atemporale* (BOURRET, 1934), *Amphiesma bitaeniatum* (WALL, 1925), *Amphiesma boulengeri* (GRESSITT, 1937), *Amphiesma craspedogaster* (BOULENGER, 1899), *Amphiesma khasiense* (BOULENGER, 1890), *Amphiesma optatum* (HU & DJAO, 1966), *Amphiesma sauteri bourreti* MALNATE, 1962 and *Amphiesma stolatum* (LINNAEUS, 1758). We have yet to examine any Vietnamese specimen of *Amphiesma modestum*, a species widely reported in the literature from northern Vietnam.

Amphiesma optatum (HU & DJAO, 1966), described from Sichuan and known from southern China (ZHAO et al. 1998), was only recently discovered at Tam Dao, in northern Vietnam (DAVID et al. 1999). It is interesting to note that another Chinese natricine species, *Sinonatrix aequivasciata* (BARBOUR, 1908), widely distributed in China (ZHAO et al. 1998), was also recently collected for the first time in Tam Dao, Vietnam (VOGEL et al. 2004). These discoveries stress the limited knowledge that we still have on the biodiversity of snakes in southeastern Asia, even in areas comparatively well investigated, such as Tam Dao Hill Station.

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Appendix

Specimens examined:

Amphiesma bitaeniatum (n = 13): Myanmar: AMNH 48468, "Huton, Kachin Hills, Burma", now in Kachin State; BMNH 1925.9.17.3, BMNH 1925.12.22.19, "Huton, Kachin Hills, Burma", now in Kachin State; BMNH 1946.1.13.58 (holotype of *Natrix bitaeniata* WALL, 1925), "Kutkai, North Shan States, Burma: 6000 feet", now Kutkai, Shan State. People's Republic of China: Yunnan Province: BMNH 1946.1.13.56, (formerly BMNH 76.2.16.4, a syntype of *Tropidonotus parallelus* BOULENGER, 1890), "Hotha, Valley, Yunnan", now Husa, Longchuan Xian; BMNH 1946.1.21.87 (formerly BMNH 76.2.16.3, a syntype of *Tropidonotus parallelus* BOULENGER, 1890), "Sanda, Upper Irrawady", now Lianghe County; CAS 215037, Nu Jiang Nature Reserve near Pianma, on western slope of Gaoligongshan (26°00'03.2N-98°39'41.6E), ca 7800 ft, Nu Jiang Xian; SMNH 1259, Yunnan; ZMB 28951, no precise locality; Guangxi Zhuang Autonomous Province: No number (M.W. LAU's collection), Cenwanglao Shan. Thailand: NRCT 980506, Doi Inthanon, Chiang Mai Province. Vietnam: BMNH 1930.11.16.5, "Fan-Si-Pan, Lao Kay, Tongking", now Mt. Phang Si Pang, Bình Thuận Province; MNHN 1999.9090, vicinity of Sapa, Lào Cai Province.

Amphiesma metusia (n = 10): People's Republic of China: Sichuan Province: BMNH 1911.12.19.1, "Szechuan"; CAS 195196-195197, vicinity of elev. 2400 m, 9.5 km north of Tuowu (28°49'N - 102°17'E), on the Hanyuan to Xichang Road, then 1.4 km NNE of dirt road, Liangshan Yizu Autonomous Prefecture; FMNH 18722, "Hsiao Yang Chi", Sichuan; FMNH 170647, "Sikang", now eastern Sichuan; FMNH 232805, 9 km west of Bin Ling, Wa Shan Camp, Hongya Xian; FMNH 232806, Hongya Xian; USNM 69926-69927, near Washan; ZMB 27866, Washan.

Amphiesma octolineatum (n = 34): People's Republic of China: MNHN 1905.289, MNHN 1907.12, "Chine" (not specified). Yunnan Province: AMNH 21022, AMNH 21024, "Lichiang-fu, 8500 ft", now Lijiang Naxizu Zizhixian; AMNH 21050, AMNH 21051 (holotype of *Natrix septemlineata* SCHMIDT, 1925), "Yunnan: Tengyueh", now Tengchong County; AMNH 35210, "Yunnan: Hsin Kai", Yunnan Province; AMNH 66653, "Yunnan: Kunming"; BMNH 1904.11.29.16-20, "Ku-taing Fu", now Gudong;

BMNH 1905.1.30.62, "Tongchuan-fu, Yunnan", now Dongchuan County; BMNH 1905.5.30.16-20, BMNH 1946.1.12.60, BMNH 1946.1.13.46, BMNH 1946.1.13.57, "Yunnan Fou", now Kunming; CAS 64272, "Yunnan"; ZMB 65438-441, ZMB 65571, ZMB 65576, ZMB 65579, ZMB 65582-584, "Talifu W-Yunnan", now Dali County. Guizhou Province: SMNH 2507, Yin River, Fanjing Shan, Hengyuanzi, 1820 m.

Amphiesma parallelum (n = 15): India: West Bengal: BMNH 60.3.19.1359, "Himalaya"; BMNH 80.11.10.153, "Darjeeling"; BMNH 1923.10.13.38, "Darjeeling District"; BMNH 1946.1.13.53 (lectotype of *Tropidonotus parallelus* BOULENGER, 1890; selected by KRAMER [1977: 728]), "Sikkim". Meghalaya: BMNH 1946.1.12.83 (formerly BMNH 70.11.30.32), BMNH 1946.1.12.84, BMNH 1946.1.13.48, "Khasi Hills", now in State of Meghalaya. ZSI/ERS 3077, Risa Colony, Shillong; ZSI/ERS 9059, Tripura Castle Road, Shillong; ZSI/ERS 9060, Selbelgiri, Garo Hills; ZSI/ERS 9070, a stream near Fruit Garden, Shillong. Nagaland: KSC 414, Sechu, 1000 m. Myanmar: BMNH 1940.6.4.29, "Pangnamdim, The Triangle, Upper Burma", a village about 24 km north-east of Watamkawng (27°43'N-97°52'E), Kachin State. Nepal: BMNH 58.6.24.5, "Nepal" (not specified). People's Republic of China: Yunnan Province: CAS 215036, Nu Jiang Nature Reserve, near Pianma (26°00'10.3 N - 98°39'31.7 E), Nu Jiang Xian.

Amphiesma platyceps (n = 3): India: FMNH 15827, "Mangpu, Sikkim"; MNHN 1988.6484, above Doda, between Makabagi and Ularbagi, Udampur District, State of Jammu and Kashmir, at about 2800 m; ZMB 7293, "Kashmir".

Amphiesma sieboldii (n = 21): India: CAS-SU 15973, Darjeeling, State of West Bengal. Nepal: BMNH 1913.5.22.1, "Maikola Valley, E. Nepal", now Mai Kola; CAS 90690, "Nepal: above Deppur (Elev. 5500 Ft); FMNH 109762, Amp Pipal, 4000'; FMNH 131966, Chapagaon, Kathmandu Valley; FMNH 131967, Kathmandu Valley; FMNH 190856, Arun Valley, at Num Bridge across Arun River; FMNH 204499, above Num, 6400' in forest area; FMNH 204500-504, no precise localities; MHNG 1355.72-73, Astam, near Hyangcha, 1600m; MNHN 2003.3614, east of Mounasko Pass, between Surkie Pass and Chheskam, Eastern Region, 2400 m; ZMB 4551, "Himalaya"; ZMB 10231, Sikkim. People's Republic of China: CAS 177474, Elev. 2000-2100 m, between Chinese check point at Zhangmu (Khasa)

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(28°07'N-85°59'E) and the Nepal border on the Lhasa-Kathmandu Rd., Xigaze Prefecture, Xizang Autonomous Region (Tibet); CAS 177672-673, Elev. 2300-2500 m, between Chinese check point

at Zhangmu (Khasa) (28°07'N-85°59E) and the Nepal border on the Lhasa-Kathmandu Rd., Xigaze Prefecture, Xizang Autonomous Region (Tibet).

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