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A new species of the snake genus *Hebius* Thompson from Northeast India (Squamata: Natricidae)

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Abstract

A new species of the family Natricidae Bonaparte is described from a single specimen obtained in Arunachal State, north-eastern India. On the basis of its external morphology and of its dentition on the upper maxilla, i.e. 24 + 3 distinctly enlarged teeth separated by a short diastema, it is referred to the genus *Hebius* Thompson. *Hebius lacrima* **spec. nov.** is distinguished from other species of the genera *Hebius*, *Amphiesma* Duméril, Bibron & Duméril and *Herpetoreas* Günther, by the combination of an elongate body, 19 dorsal scale rows at midbody, a distinctive broad, white band on the supralabials interrupted by a dark blotch below the eye, absence of dorsolateral stripes replaced by series of transversally elliptical or divided dorsolateral spots, a cream venter with lateral dark blotches, and scales of the first dorsal scale row entirely smooth. The interrupted, broad, lateral stripe of the head differentiates *Hebius lacrima* **spec. nov.** from all other species of the genera *Hebius* and *Herpetoreas* inhabiting the Indo-Himalayan and Indochinese Regions. This new species is compared in detail with other Asian species of Natricidae having 19 dorsal scale rows.

Key words: Arunachal Pradesh, India, *Hebius*, *Herpetoreas*

Introduction

The genus *Amphiesma* Duméril, Bibron & Duméril, as defined by Malnate (1960, 1962) and Malnate & Underwood (1988) has long included a high number of species widely distributed over the whole of southern, eastern and south-eastern Asia (see Wallach *et al*. 2014). On the basis of molecular analyses, Guo *et al*. (2014) split the genus *Amphiesma* Duméril, Bibron & Duméril into three genera, i.e. *Amphiesma*, restricted to *A. stolatum*, *Hebius* Thompson, for most species previously referred to *Amphiesma*, and *Herpetoreas* Günther for the Indo-Himalayan species *Herpetoreas sieboldii* Günther, *Herpetoreas platyceps* (Blyth) and a new species, *Herpetoreas burbrinki* Guo, Zhu, Liu, Zhang, Li, Huang & Pyron. Lastly, Kizirian *et al*. (2018) synonymized the genera *Parahelicops* Bourret, which included the sole species *Parahelicops annamensis* Bourret, and *Pararhabdophis* Bourret, for *Pararhabdophis chapaensis* Bourret, with the genus *Hebius*.

At species level, the diversity of Asian natricids is definitely still incompletely known. We can mention the recent description of two species now referred to the genus *Hebius*, *Amphiesma andreae* Ziegler & Le and *Amphiesma leucomystax* David, Bain, Nguyen, Orlov, Vogel, Vu & Ziegler. Some species have been resurrected from synonymy such as *Natrix clerki* Wall, previously confused with *Amphiesma parallelum* (Boulenger) (see David *et al*. 2015) and which should now be referred to the genus *Hebius*. Additional species will be revalidated and described elsewhere.

Field researches in remote parts of the State of Arunachal Pradesh by the first author resulted in the discovery of a single snake specimen sharing characters with members of both *Hebius* and *Herpetoreas*. However, this specimen does not fit with any known species of natricid snakes occurring either in India, in the Indo-Himalayan Region or in any other region of tropical Asia. Its morphological characters, especially its dentition, do not agree with those of the genera *Rhabdophis* or *Xenochrophis* but agree well with those of the genus *Hebius* Thompson as

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defined by Guo *et al*. (2014). We regard it as a new species of this genus, which is here described. The generic relationships of this species are discussed.

Material and methods

We investigated only external morphological characters regarded as taxonomically significant by Malnate (1960, 1962), Malnate & Underwood (1988), and David *et al*. (2007, 2013, 2015). Maxillary teeth were counted on the dissected right maxilla, with its exterior gum removed; tooth sockets were included in the count as several teeth were missing. The hemipenes were observed *in-situ*.

All measures are in millimetres. Body and tail lengths were measured to the nearest millimetre; head measurements were taken with a slide-calliper to the nearest 0.02 mm. The number of ventral scales is counted according to Dowling (1951). The numbers of dorsal scale rows are given at one head length behind head, at midbody (i.e. at half of SVL), and at one head length before vent respectively. Values for symmetric head characters are given in left/right order.

Comparison with species of the genera *Amphiesma*, *Hebius* and *Herpetoreas* was based on the literature, especially on data provided in David *et al*. (2007, 2015), and on examined specimens listed in Appendix I.

Abbreviations of measures and other meristic characters used in the text. Measures and ratios: HL: head length. SVL: snout-vent length. TaL: tail length. TL: total length. TaL/TL: ratio tail length/total length. Meristic characters: DSR: formula of dorsal scale rows. IL: infralabials. SC: subcaudal scales. SL: supralabials. VEN: ventral scales.

Museum abbreviations: AMNH: The American Museum of Natural History, New York, USA. BMNH: The Natural History Museum, London, United Kingdom. CAS: California Academy of Sciences, San Francisco, USA. CIB: Chengdu Institute of Biology, Chengdu, People's Republic of China. CTNRC: Center for Thai National Reference Collections, National Research Council of Thailand, Bangkok, Thailand. FMNH: The Field Museum of Natural History, Chicago, USA. IEBR: Institute for Ecology and Biological Research, Hanoi, Vietnam. IISER: Indian Institute of Science Education and Research, Pune, India. KFBG: Kadoorie Farm and Botanic Garden, Hong Kong SAR, People's Republic of China. KSC: Kohima Science College, Kohima, India KZM: Korat Zoo Museum, Korat, Thailand. LSUHC: La Sierra University Herpetological Collection, Riverside, California, USA. MHNG: Museum d'Histoire Naturelle, Geneva, Switzerland. MNHN: Muséum National d'Histoire Naturelle, Paris, France. MVZ: Museum of Vertebrate Zoology, Berkeley, California, USA. MZB: Bogor Zoological Museum, Bogor, Indonesia. NCSM: North Carolina State Museum of Natural Sciences. NMW: Naturhistorisches Museum Wien, Vienna, Austria. PSGV: Gernot Vogel's private collection, Heidelberg, Germany. PSUaa: Penn State Altoona College, Altoona, USA. QSMI: Queen Saovabha Memorial Institute, Thai Red Cross, Bangkok, Thailand. ROM: Royal Ontario Musem, Toronto, Canada. SMNH: Shanghai Museum of Natural History, Shanghai, People's Republic of China. THNHM: Thailand Natural History Museum, Pathum Thani, Thailand. USNM: United States National Museum, Washington, USA. VNUH: Vietnam National University, Hanoi, Vietnam. ZISP: Zoological Institute, Russian Academy of Science, St. Petersburg, Russia. ZMB: Zoologisches Museum für Naturkunde der Humboldt-Universität zu Berlin, Berlin, Germany. ZRC: Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore. ZSI: Zoological Survey of India, Kolkata, India. VR/ERS/ZSI: Zoological Survey of India (Eastern Regional Station), Shillong, India.

Results

By having laterally situated nostrils, internasals that are broad anteriorly, maxilary teeth in continuous serious gradually becoming larger posteriorly with last three teeth distinctly enlarged and a simple hemepenis and sulcus spermaticus , this specimen is undoubtedly a member of the "*Amphiesma* complex" as defined by Malnate (1960), i.e. a species of any of the genera *Amphiesma*, *Hebius* and *Herpetoreas* as currently recognized by Guo *et al*. (2014). Although only a single specimen of this species is available, by its sole external morphology, it differs from all known species of these genera. We consider it to represent a distinct species that is described as follows:

***Hebius lacrima* spec. nov.**
(Figs. 1 & 2)

Holotype. VR/ERS/ZSI/610, adult male, from Basar (27.980559°N, 94.688496°E), West Siang District, State of Arunachal Pradesh, India, at ca. 600 metres a.s.l. Collected by a villager, preserved in concentrated formalin and subsequently given to Jayaditya Purkayastha, 7 August 2010.

Diagnosis. A species of the genus *Hebius* characterized by combination of the following characters: (1) body elongate; (2) tail amounting for 30.1 % of the total length; (3) 24 gradually enlarged maxillary teeth, followed, with a diastema, by 3 distinctly enlarged posterior teeth; (4) nostrils lateral; (5) internasals broad anteriorly; (6) 2 preoculars; (7) 1 anterior temporal, (8) 19–19–17 dorsal scale rows, distinctly keeled except scales of the 1st rows, smooth but distinctly enlarged; (9) 147 ventrals, not keeled (+ 2 preventrals); (10) anal divided; (11) 89 subcaudals; (12) a white stripe extending on the middle of supralabials from the edge of rostral and 1st SL to the anterior half of the 6th SL just below the eye; a second stripe, slightly higher on the labials and temporal regions than the first one, extends from the 7th SL to the 9th SL then beyond the angle of jaw to the nape, producing a short V-like chevron; (13) a dark area on the posterior half of 6th SL, separating the two white stripes; (14) dorsum dark greyish-brown variegated with blackish-brown blotches, without stripe or aligned dorsolateral dots; (15) venter ivory with a large, elongate blotch parallel to the body axis near the tips of each ventral, forming a discontinuous ventrolateral stripe.

Description of holotype. Body moderately stout; head average (3.6% of SVL), distinct from the neck; snout long, flattened, 34.7% of HL, 1.7 times as long as horizontal diameter of the eye, blunt from above, subrectangular in profile; nostril lateral, crescentic, piercing in the middle of divided nasal in its lower half; eye moderately sized, diameter 1.5 times greater than distance between its inferior margin and edge of upper lip; pupil round; tail cylindrical and tapering.

Size. SVL: 340 mm; TaL: 147 mm; TL: 487 mm; HL: 12.4 mm; ratio TaL/TL: 0.301.

Dentition. A total of 27 maxillary teeth: 24 gradually enlarged + 3 distinctly enlarged posterior teeth, separated from anterior teeth by a short diastema.

Hemipenis. The organ was examined in situ. As it was in very bad condition and brittle because of the formalin used to preserve the specimen, we could observe only its general features. Hemipenis short, reaching the 5th subcaudal, simple and seemingly smooth.

Body scalation. DSR: 19–19–17, not notched at their posterior extremity, distinctly keeled with a narrow, sharp keel, more keeled on posterior half of body except scales of 1st DSR, all smooth and enlarged.

Dorsal scale row reduction:

4+5 → 4 (93) (left)
19 ——————————17
4+5 → 4 (97) (right)

147 VEN (+ 2 preventrals); 89 SC, all paired. Anal divided.

Length of the portion of tail with 6 dorsal scale rows (expressed in number of subcaudals; see Malnate & Underwood 1988): 31; length of the portion of tail with 4 scale rows: 24. Ratio Length 6 rows / Length 4 rows: 1.29.

Head scalation. Rostral hexagonal, wider than high; nasals subrectangular, longer than high, divided below the nostril, with crescentic, laterally opening nostril in its middle; internasals subtriangular and barely narrowing anteriorly, 1.1 times as long as wide and about 0.95 times as wide anteriorly than posteriorly; prefrontals rectangular, almost subequal, in contact with loreal; frontal hexagonal, large, 1.45 times as long as wide, with apex directed posteriorly, 1.8 times longer than suture between prefrontals; parietals twice as long as wide, in contact along a length 1.13 times as great as frontal length; 1/1 loreal, small, rectangular, elongate horizontally, 0.9 time as high as long, in broad contact with nasal; 2/2 preoculars; 3/3 postoculars, upper one much larger than the two lower ones; 9/10 supralabials, 1st–3rd in contact with nasal, 3rd–4th in contact with loreal, 4th–6th entering orbit, 8th–9th / 7th–8th largest; temporals: 1+1 / 1+1, anterior one large and elongate; 9/10 infralabials, first pair in contact behind the mental, 1st–4th IL in contact with anterior chin shields; posterior chin shields longer than anterior ones, followed by one pair of gulars.

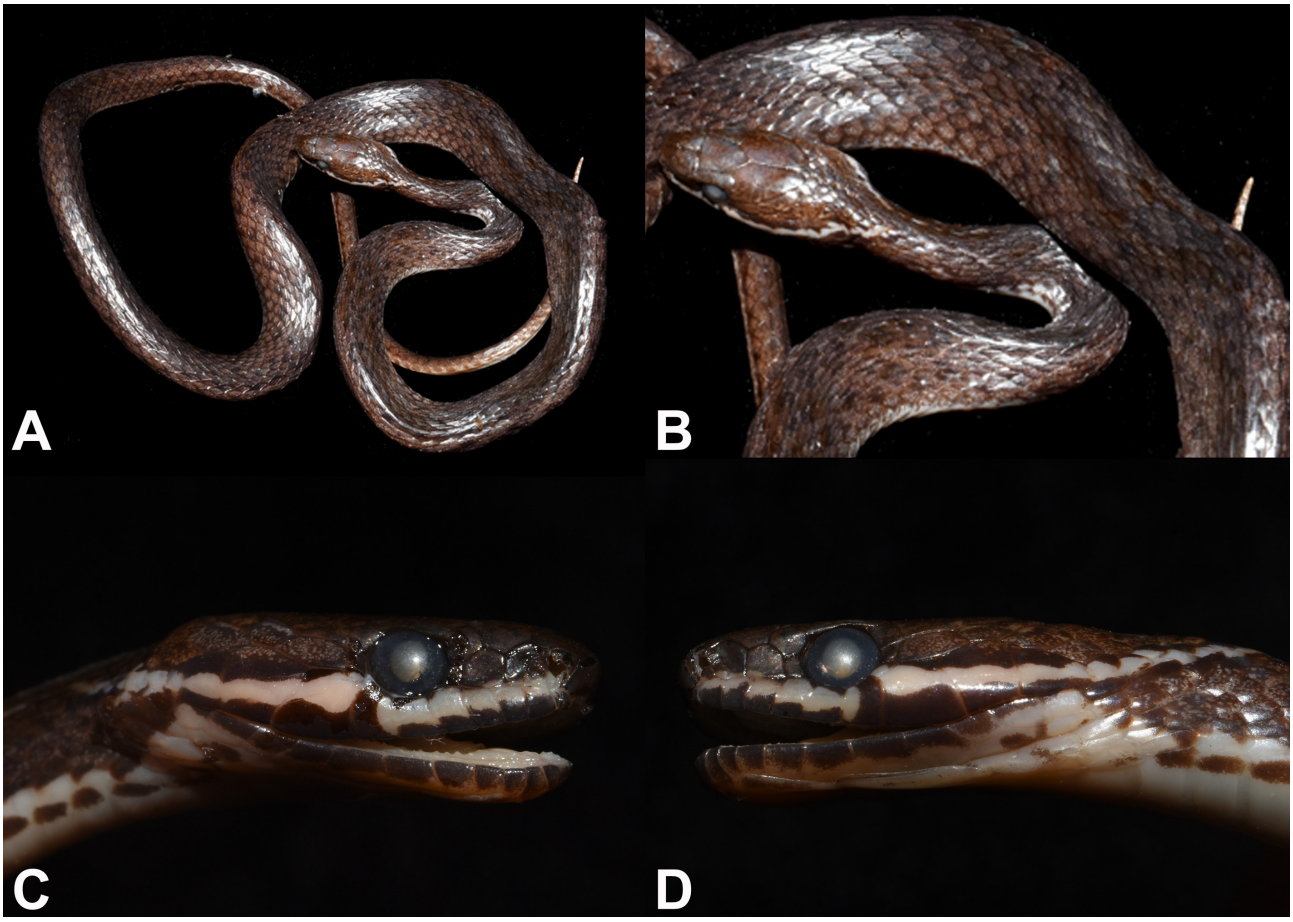

FIGURE 1. Preserved holotype of *Hebius lacrima* **spec. nov.**, VR/ERS/ZSI/610, adult male. A: general view. B: close-up view of the dorsal pattern. C: left side of head. D: right side of head.

Coloration in alcohol. Body dark greyish-brown above, with scales irregularly marbled with blackish-brown and cream spots; on each side, three rows of irregular, faint dark blotches, not vertically aligned, usually on 3rd, 5th and 9th DSR; on each side of the anterior part of the body, a short dorsolateral row made of a total of six cream, elongate spots along a length equal to about 2.5 head lengths behind the nape region; scales of the first twelve scales of the 1st DSR ivory, producing a short, conspicuous, ventrolateral stripe; the ivory area of scales of the 1st DSR decreases quickly in size.

Head dark brown above and on its sides, somewhat paler on the temporal region, with irregular paler brown vermiculation and some scattered beige dots; a short cream sagittal line just on the occipital region behind parietal suture; rostral brown; a broad but irregular, pure white stripe extends from the posterior edge of the rostral to the anterior half of 6th SL across the lower part of nasal, the lower edge of loreal and the central part of 1st–5th supralabials, covering about one third of the height of these supralabials with their upper and lower parts dark brown; posterior half of 6th SL, just below the eye, dark brown, looking like a "tear" interrupting the white lateral stripe, the limit between the anterior white stripe and the dark area being curved towards the snout; a second pure white stripe, slightly higher on the head side than the anterior one, extends from the upper half of 7th SL across the central part of 8th and 9th SL up to the corner of the mouth then farther on the nape, thick along a length of three or four scales then narrow, directed obliquely upwards, the branch of each side producing a conspicuous V-like chevron on the neck; eye black. The chin and throat are ivory; anterior chin shields marbled with irregular brown areas; mental and infralabials heavily marked with blackish-brown spots.

The venter is ivory; at the base of the triangular tip of each ventral a conspicuous, elongate blackish-brown blotch forming a discontinuous dark ventrolateral stripe that extends along the whole of the body; the ivory tip of each ventral contrasts with both the inner dark brown blotch of each ventral and the dark color of scales of the 1st DSR posterior to the 12th ventrals, producing a pale ventrolateral stripe. Under surface of tail ivory, with the outer

part and tip of each subcaudal blackish-brown, producing a dark ventral stripe not separated from the dark color of the dorsal surface of the tail.

Etymology. The species nomen derives from the Latin noun *lacrima* (*-ae*), meaning "a tear", a reference to the dark area under the eye looking like a black tear which interrupts the white supralabial stripe. This species nomen is a noun in apposition and not an adjective.We suggest the following common names: Crying Keelback (English).

Ecological notes. The single known specimen was obtained from a rice field alongside a hill slope (Fig. 3) in the outskirt of the city of Basar (Fig. 4), so in a heavily disturbed area. A small stream was flowing adjacent to this field. An indigenous agricultural practice called Jhum (shifting) cultivation was done in the hills adjacent to the rice field.

FIGURE 2. Preserved holotype of *Hebius lacrima* **spec. nov.**, VR/ERS/ZSI/610, adult male. A: Dorsal view of head. B: Ventral view of head. C: Ventral view.

Discussion

Generic allocation. In the absence of molecular data, we cannot ascertain the generic relationships of this new species. We here tentatively refer it to the wide-ranging genus *Hebius* as defined by Guo *et al*. (2014) on the basis of its elongate body, of the pattern of the venter and of its dentition on the upper maxilla i.e., three enlarged teeth separated by a short diastema from anterior maxillary teeth. Such a dentition is also found in species such as *Hebius clerki* and *H. parallelus* (see David *et al*. 2015).

We agree on the fact that an allocation of this new species to the genus *Herpetoreas* cannot be ruled out. However, besides the white, interrupted stripe running along the supralabials and lower temporals, *Hebius lacrima* **spec. nov.** differs from species currently recognized in the genus *Herpetoreas*, i.e. *H. platyceps* (Blyth), *H. sieboldii* (Günther) and *H. burbrinki* Guo, Zhu, Liu, Zhang, Li, Huang & Pyron, 2014, by the following characters: (1) fewer ventrals, 147 vs. 191–234 [$\bar{x}$: 211.5] in *H. platyceps*, 168–207 [$\bar{x}$: 191.0] in *H. sieboldii*, and 172 in *H. burbrinki*; (2) a higher ratio TaL/TL, 0.301 vs. 0.232–0.286 [$\bar{x}$: 0.250] in *H. platyceps* and 0.208 in *H. burbrinki*,

and at the upper limit of the range of *H. sieboldii*, 0.242–0.301 [$\bar{x}$: 0.276]. Furthermore, this latter species has a faint white stripe on each side of the body (vs. absent in *Hebius lacrima* **spec. nov.**).

The genus *Amphiesma* is currently restricted to its type species, *Amphiesma stolatum* (Linnaeus). The diagnosis of the genus provided by Guo *et al*. (2014) is very short and, on a purely morphological basis, may apply to most members of the former genus *Amphiesma*, i.e. the genera *Amphiesma, Herpetoreas* and *Hebius* Nevertheless, *A. stolatum* differs from *Hebius lacrima* **spec. nov.** by its dorsal pattern, presenting a series of dark crossbars on the back and on the sides and with a conspicuous buff, ochre-yellow or yellowish-brown dorsolateral stripe extending throughout the body on 5th–7th scale rows (vs. no stripe), supralabials cream or beige anteriorly, grey posteriorly, with two oblique, black streaks below the eye on 5th and 6–7th supralabials respectively (vs. supralabials pure white with a black blotch on 6th SL), 8 (rarely 7 or 9) supralabials (vs. 9/10), and last maxillary teeth abruptly and strongly enlarged (vs. only distinctly enlarged).

Comparisons with species of the genus *Hebius*. *Hebius lacrima* **spec. nov.** can be differentiated from all other species of the genus *Hebius* by the combination of (1) a distinctive broad, white, interrupted stripe on the supralabials, (2) each side with three rows of irregular dark blotches, not vertically aligned, (3) a short dorsolateral row made of a total of six cream, elongate spots on its anterior part, and (4) the first dorsal scale row being entirely smooth. The interrupted pale head stripe differentiates *Hebius lacrima* **spec. nov.** from all other natricid species of the Indo-Himalayan and Indochinese Region.

FIGURE 3. Habitat of the holotype of *Hebius lacrima* **spec. nov.**, West Siang District, State of Arunachal Pradesh, India, at ca. 600 metres a.s.l.

Hebius lacrima **spec. nov.** is further distinguished from *Hebius annamensis* (Bourret), *Hebius atemporalis* (Bourret), *Hebius chapaensis* (Bourret), *Hebius groundwateri* (Smith), *Hebius sauteri* (Boulenger) (including the subspecies *H. s. bourreti* and *H. s. maximus*), *Hebius venningi* (Wall) and *Hebius taronensis* (Smith), as well as three species present in Borneo, i.e., *Hebius arquus* (David & Vogel), *Hebius frenatus* (Dunn) and *Hebius sarawacensis* (Günther), by having 19 DSR vs. 17 rows in these species or sometimes 15 in *H. annamensis*.

Furthermore, *Hebius venningi* has a venter pale mesially on the anterior part of the body, clouded with darker hues of brown on the outer parts of ventrals, entirely clouded posteriorly (entirely creamish-white in *Hebius lacrima* **spec. nov.**) and a distinct dorsal pattern composed of large elongate blotches (faint series of three dark blotches in *H. lacrima* **spec. nov.**). *Hebius atemporalis* lacks temporal scales (present in *H. lacrima* **spec. nov.**).

Among other species of *Hebius* with 19 dorsal scale rows, *Hebius bitaeniatus* (Wall), *H. parallelus* (Boulenger) and *H. clerki* (Wall) possess distinct continuous, more or less bright dorsolateral stripes (absent in *Hebius lacrima* **spec. nov.**). A description of *Hebius bitaeniatus* can be found in David *et al*. (2005) whereas the complex of *Hebius parallelus* and *H. clerki* was reviewed in David *et al*. (2015). Furthermore, *H. clerki* has more ventrals, 158–173 (vs. 147) and scales of the 1st DSR are strongly keeled (vs. smooth). *H. parallelus* has more ventrals, 160–173, and fewer subcaudals, 63–77 (vs. 147 and 89 respectively). *H. bitaeniatus* also differs in having more ventrals, 153–177 (vs. 147) and scales of the 1st DSR are strongly keeled (vs. smooth). Lastly, among these conspicuously striped species, *H. octolineatus* (Boulenger) has a distinctly shorter tail, with ratio TaL/TL ranging between 0.208–0.258 (vs. 0.301).

Among Chinese species of *Hebius* (see Zhao *et al*. 1998; Zhao 2006), *Hebius metusia* (Inger, Zhao, Shaffer & Wu) differs by having a dorsal pattern both blotched and striped (vs. blotched), more ventrals, 159–164 (vs. 147), and a different pattern of the supralabials. *Hebius optatus* (Hu & Zhao) and *Hebius andreae* (Ziegler & Le) possess pale, transversal, narrow or wide dorsal crossbars (vs. on each side three rows of irregular, faint dark blotches, not vertically aligned). Furthermore, *H. optatus* has more ventrals (156–169 vs. 147) and supralabials dark with two white streaks running from the lower edge of eye. Lastly, *Hebius lacrima* **spec. nov.** differs from *Hebius popei* (Schmidt) by a slightly higher number of ventrals, 131–142 (vs. 147), a different dorsal pattern made of pale crossbars on dorsolateral stripes and a large, white nuchal blotch (vs. dorsolateral stripes absent and a V-like chevron present).

Several Indo-Himalayan and Indochinese species of the genus *Hebius* with 19 DSR have the venter partly or entirely dark brown or blackish-brown. This group includes *Hebius modestus* (Günther), *Hebius deschauenseei* (Taylor) and a species under description (David *et al*. in prep.). *H. modestus* differs from *Hebius lacrima* **spec. nov.** in having a venter pale in its centre but more or less extensively dark on its sides (vs. entirely creamish-white with lateral dark dots), supralabials creamish-yellow, yellowish-brown or pale brown, usually speckled with dark brown and all edged with dark brown or blackish-brown (vs. a broad, entirely white central area), the lack of postocular stripe (vs. present), usually a dorsolateral stripe (vs. absent) and more subcaudals, 104–122 vs. 89. *Hebius deschauenseei* differs from *Hebius lacrima* **spec. nov.** by the pattern of its venter, covered with three rows of large dark blotches (vs. creamish-white), a dorsolateral stripe (vs. absent), supralabials strongly powdered with olive-brown, greyish-brown or pale brown and edged with dark brown, and more subcaudals, 115–141 SC (vs. 89). Lastly, *Hebius* sp., currently under description, differs by its venter entirely dark (vs. creamish-white), dark supralabials, a dorsolateral series of large, orange or rusty-red blotches, a high number of ventrals, at least 159 (vs. 147), and very strongly keeled scales around the base of the tail (vs. smooth). Tentatively included in this group, *Hebius xenura* (Wall) differs from *Hebius lacrima* **spec. nov.** by its single subcaudals (vs. divided).

Hebius lacrima **spec. nov.** shares some characters with species of the "*Hebius khasiensis* species-group" as defined in David *et al*. (2013; as the "*Amphiesma khasiense* species-group"). This artificial group contains seven species: *H. khasiensis* (Boulenger), *H. atemporalis* (Bourret) (with 17 DSR, see above), *H. boulengeri* (Gressitt), *H. inas* (Laidlaw), *H. johannis* (Boulenger), *H. kerinciensis* (David & Das) and *H. leucomystax* (David, Bain, Nguyen, Orlov, Vogel, Vu & Ziegler). Both *H. khasiensis* and *H. inas* differs from *Hebius lacrima* **spec. nov.** by the pattern of their supralabials, composed of distinct, pale blotches in *H. khasiensis* and *H. inas*, at least on the posterior supralabials (vs. two consecutive white stripes), scales of the 1st DSR distinctly keeled, at least posteriorly, in *H. inas* and *H. khasiensis* (vs. smooth). Furthermore, the pattern of the neck in *H. khasiensis* is usually made of isolated rounded blotches, sometimes partly connected by a narrow pale line (vs. a conspicuous V-like chevron on the neck).

Although *Hebius boulengeri* (Gressitt) also possesses a distinct white streak on the supralabials and neck, it is narrow (vs. broad) and extends from the posterior lower margin of the eye on posterior supralabials up to the nape, without forming a strong chevron (vs. first labial stripe, before the black "tear", extending from the snout). *H. boulengeri* further differs from *H. lacrima* **spec. nov.** by the presence of distinct dorsolateral stripes marked with irregular spots (vs. absent).

Regarding other species of the *H. khasiensis* complex, *Hebius johannis* is further differentiated from *H.*

lacrima **spec. nov.** by the number of supralabials, 7–8 (vs. 9–10), a higher number of ventrals, 165–175 according to Zhao *et al*. (1998) (vs. 147). *H. craspedogaster* further differs from *H. lacrima* **spec. nov.** by the number of anterior temporals, usually 2 or 3 (vs. 1) (Pope 1935; Zhao *et al*. 1998).

The sole other species of *Hebius* with a broad, white stripe on the supralabials is *Hebius leucomystax* (see David *et al*. 2007). This latter species differs from *H. lacrima* **spec. nov.** by having an uninterrupted white stripe on the supralabials (vs. interrupted on the 7th supralabial), and lower numbers of ventral scales, 154–166 (vs. 147) and of subcaudals 94–103 (vs. 89).

Lastly, in the Indo-Himalayan Region, *Hebius pealii* (Sclater) differs from *H. lacrima* **spec. nov.** by having a single cloacal plate (vs. divided), two anterior temporals (vs. 1), 19–21 maxillary teeth (vs. 26 or 27), and a different dorsal pattern.

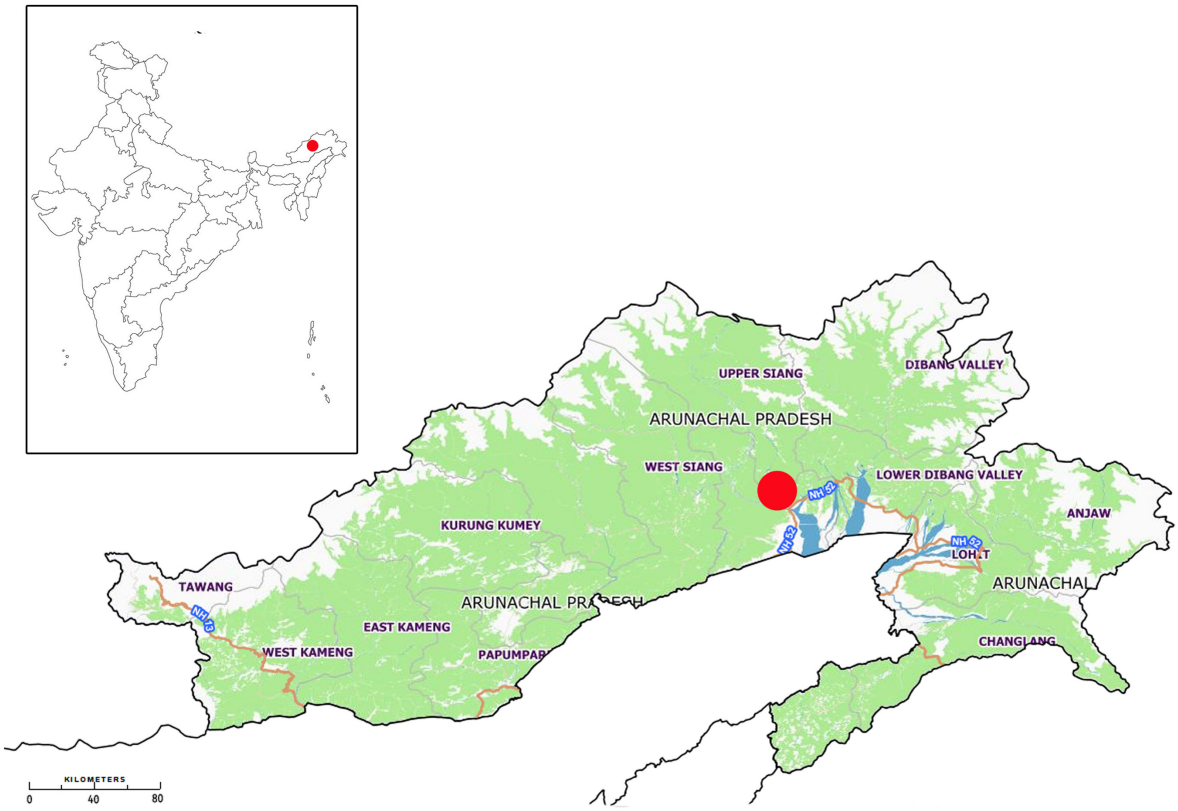

FIGURE 4. A map of the state of Arunachal Pradesh showing the locality (Basar) of *Hebius lacrima* **spec. nov.** (solid red circle); Inset: a map of India pointing to (solid red circle) Arunachal Pradesh.

Conclusion

Borang *et al*. (2005) mentioned the occurrence of six species of keelback snakes currently referred to the genera *Amphiesma*, *Hebius* and *Herpetoreas* in the State of Arunachal Pradesh: *Amphiesma stolatum*, *Hebius khasiensis*, *H. modestus*, *H. parallelus*, *H. venningi*, and *Herpetoreas platyceps*. Sanyal & Gayen (2006) admitted the occurrence of only *Amphiesma stolatum*, *A. modestus* and *A. platyceps*. As shown by David *et al*. (2015), *H. parallelus* is restricted to the Khasi Hills, with a dubious record from Sikkim. In Arunachal Pradesh, this latter species is replaced by *H. clerki*. The description of *Herpetoreas platyceps* given in Sanyal & Gayen (2006) does not allow us to positively choose between *H. platyceps* and *H. sieboldii*. However, according to Malnate (1966), the distribution of *H. platyceps* does not extend eastwards of Darjeeling, State of Sikkim, whereas Arunachal Pradesh is well in the range of *H. sielboldii*. Nevertheless, the description of *Hebius lacrima* **spec. nov.** brings to seven the number of species of the *Amphiesma* complex in Arunachal Pradesh.

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APPENDIX. Examined specimens

Hebius atemporalis (*n* = 7). **Vietnam**. Vinh Phuc Province. MNHN 1935.0077–78, MNHN 1935.0450, MNHN 1938.0120, MNHN 1958.0461–62, "Tam Dao", now Tam Dao Hill Station. No locality. MNHN 1938.0119, "Indochine", no precise locality.

Hebius bitaeniatus (*n* = 21). **Myanmar**. AMNH 48468, "Huton, Kachin Hills, Burma", now Huton, 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, "Kutkai, North Shan States, Burma: 6000 feet", now Kutkai, Shan State. **People's Republic of China**. Yunnan Province. BMNH 1946.1.13.56, "Hotha Valley, Yunnan", now the valley around Husa, Longchuan County; ZSI 8532, ZSI 8534–36, ZSI 8540, "Hotha, Yunnan", now Husa, Longchuan County; BMNH 1946.1.21.87, "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 7,800 ft, Nu Jiang Xian; SMNH 1259, Yunnan; ZMB 28951, no precise locality; ZSI 8531, "Muangla Valley", now Muangla, Lianghe County; ZSI 8539, "Ponsee", now Pengxi, Yinjiang County. Guangxi Autonomous Province. 1 specimen, M. W. LAU'S collection (no number), Cenwanglao Shan. **Thailand**. THNHM 25698 (ex CTNRC 980506), Doi Inthanon, Chiang Mai Province. **Vietnam**. Lào Cai Province. BMNH 1930.11.16.5, "Fan-Si-Pan, Lao Kay, Tongking", now Mt. Phan Si Pang; MNHN 1999.9090, vicinity of Sapa; ROM 38098, Lao Cai.

Hebius boulengeri (*n* = 95). **People's Republic of China**. Yunnan Province. CIB 584172–584173, Pingbian Miaozu Zizhixian. Guizhou Province. CIB 63II5098, Leishan. Guangxi Province. CIB 602339, Yao Shan; KFBG 9.VIII.1999, Jingxi. Jiangxi Province. MVZ 23622 (Paratype), "Hong San, alt. 850 meters, S. Kiangsi Province, south-eastern China (lat. 24° 58' N., long. 115° 50' E.)", now near Jitan, Xunwu County. Guangdong Province. MVZ 23623 (Holotype), "Tai-yong, alt. 640 meters, E. Kwantung province, south-eastern China (lat. 23° 34' N., long. 115° 55' E), now Dayang, Jiexi County; SMNH 1238, no locality; ZMB 27694, "N-Kuangtung, China", i.e. northern Guangdong. Hainan Island and Province. CIB 745084, Diaoluo Shan. **Vietnam**. Lao Cai Province. AMNH 153704, "Lao Cai"; MNHN 1935.0064, "Chapa", now Sa Pa. Ha Giang Province. AMNH 148562, Yen Minh County. Lang Son Province. IEBR 2447, Mau Son. Vinh Phuc Province. IEBR 1290, MNHN 1935.0061–0063, MNHN 1935.0451–0453, MNHN 1958.0459–0460, MNHN 1997.3307, MNHN 1999.9093–9094, MVZ 224141–224143, MVZ 224145–224148, MVZ 224153, MVZ 226513, MVZ 226515, PSGV 0002 S, Tam Dao Hill Station. Quang Nam Province. AMNH 148552, Tra My; IEBR 2977, ROM 03848, ROM 21434, ROM 21438, Tay Gian. Kon Tum Province. IEBR 353, IEBR 1650–1652, IEBR 1654–1656, IEBR 1658–1662, IEBR 2537, IEBR 2540–2541. Gia Lai Province. FMNH 252117–252123, Ankhe. Lam Dong Province. BMNH 1921.4.1.3–4.1.5, BMNH 1969.1716–1718, Lang Bian Plateau, near Dalat; NCSM 77326, Bidoup-Nui Ba National Park, Lac Duong, 1,433 m, 12.16222°N, 108.665°E; NCSM 77328, NCSM 77333, Bidoup-Nui Ba National Park, Lac Duong, 1,494 m, 12.17528°N, 108.7006°E; NCSM 77334, Bidoup-Nui Ba National Park, Lac Duong, 1,484 m, 12.14417°N, 108.6772°E. No locality. CAS 73737, FMNH 71709, "South Vietnam"; FMNH 178399, "French Indochina". **Laos**. Xiengkhuang Province. MNHN 1928.0056-0057, "Xiengkhouang", former city of Xiengkhuang, now in the vicinity of Phonsavan. **Cambodia**. Kampot Province. BMNH 1928.6.29.9, 1969.1710-1715, BMNH 1969.1720, "Bokor Mts.", now Chuor Phnom Damrei, near Bokor Hill Station. Pursat Province. LSUHC 07442–07444, LSUHC 07464–07465, LSUHC 07484, Phnom Aural. **Thailand**. Nakhon Ratchasima Province. FMNH 180153–180154, Khao Yai National Park.

Hebius clerki (*n* = 10). **Nepal (?)**. BMNH 58.6.24.5, "Nepal". **India**. Sikkim. BMNH 60.3.19.1359, NMW 22383:2, "Sikkim", no precise locality. State of West Bengal. BMNH 80.11.10.153, "Darjeeling"; BMNH 1923.10.13.38, "Darjeeling District". State of Arunachal Pradesh. IISER RS09, Talle Valley. State of Nagaland. KSC 414, Sechu, 1000 m. **Myanmar**. Kachin State. BMNH 1946.1.13.50 (Holotype), "Sinlum Kaba, Kachin Hills", now Sinlumkaba; BMNH 1940.6.4.29, "Pangnamdim, The Triangle, Upper Burma", a village about 24 km northeast of Watamkawng (27°43'N-97°52'E). **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 County.

Hebius craspedogaster (*n* = 11). **People's Republic of China**. Fujian Province. BMNH 1910.9.6.2, "South Fokien"; BMNH 1946.1.12.63–65, "Kuatun, N.W. Fokien", now Guadun, Wuyi Shan, Chongan County; SMNH 2757, SMNH 3592–3594, Congan Shangang. Guizhou Province. MNHN 1912.0324-26, no locality.

Hebius deschauenseei (*n* = 17). **Thailand**. Chiang Mai Province. BMNH 1969.1721–1725, "Pa Meang, Me Nga, N. Siam", BMNH 1974.5193, "Pa Meang, Me Nga, N. Thailand", now in the vicinity of Pa Muang (or Pamuang); CUB MZ(R)5, Forestry Station, Doi Suthep, 3,000 ft; CUB MZ(R)36118, Doi Suthep; FMNH 178396–178398, Chiang Mai. *Chiang Rai Province*. BMNH 1969.1719, "Doi Chang", now Doi Chang (Mt. Chang), Chiang Rai District. *Unspecified locality*. BMNH 1921.4.1.6–9, "Hills of North Siam"; CUB MZ(R)1999.63, "Thailand".

Hebius inas (*n* = 10). **Thailand**. Nakhon Si Thammarat Province. BMNH 1916.3.27.31, Khao Wang Hip (upper camp). **Federation of Malaysia**. *West Malaysia*. State of Pahang. MNHN 1999.9092, Cameron Highlands; ZRC 2.4055, Cameron Highlands, 4,500′; ZRC 2.4056–4058′, Cameron Highlands, 4–5,000′; ZRC 2.4059, Fraser's Hill; ZRC 2.5920, Gunung Brinchang; BMNH 1938.8.7.13–14, Bukit Fraser (or Fraser's Hills).

Hebius johannis (*n* = 2). **People's Republic of China**. MNHN 1912.0272–73, "Chine occidentale et Marches thibétaines", i.e. Western China and Tibet.

Hebius kerinciensis (*n* = 2). **Indonesia**. *Sumatra*. Lampung Province. MZB 2186, Kubu Perahu, Bukit Barisan Selatan National Park, near Lake Ranau. Sumatera Barat Province. ZRC 2.3521 (holotype), Sungai Jalnei Dalam, at base of Gunung Tugu (or Tujuh) (01°42'59.0"S-101°21'43.1"E), Gunung Kerinci.

Hebius khasiensis (*n* = 35). **India**. State of Meghalaya. BMNH 1946.1.12.80–1946.1.12.82, BMNH 1946.1.13.45, Khasi Hills. State of Arunachal Pradesh. P 377–379, Dihang Dibang Biosphere Reserve, District of Dibang Valley; ZSI 23926, Changlang. State of Nagaland. KSC 140, Kohima. **Myanmar**. Chin State. CAS 220023, Nat Ma Taung National Park (21°22'20.1N 93°58'34.6E), Min Dat Township, Min Dat District. Kachin State. BMNH 1946.1.13.62 (holotype of *Natrix gilhodesi* Wall, 1925), BMNH 1946.1.13.63, BMNH 1925.4.2.10–15, BMNH 1925.4.2.15A, "Huton, Bhamo District (30 miles north-east of Bhamo; circa 4,500 feet; Lat. Circa 97° ·33; Long. Circa 24° ·24)", now Hutung; BMNH 1974.884, Nawng Hkai, near Putao; CAS 221504, between Babaw and Rabaw (27°26'28.4N 97°55'06.3E), Naung Mon Township, Putao District; CAS 221525, Rabaw (27°26'28.4N 97°55'07.5E), Naung Mon Township, Putao District; CAS 221543, Rabaw (27°26'14.9N 97°55'21.1E), Naung Mon Township, Putao District; CAS 224654, Nagmung (27°30'18.8N 97°48'33.9E), Nagmung Township, Putao District; CAS 224694, Nagmung (27°29'49.6N 97°49'06.9E), Nagmung Township, Putao District. Kayah State. MNHN 1893.0399, Monts Karen. **People's Republic of China**. Yunnan Province. CIB 2000I0009, Ruili; CIB Xi0089, Xichuangbanna. **Laos**. Phongsaly Province. MNHN 2004.0248, Long Nai Tai. **Thailand**. Chiang Rai Province. KZM 001, QSMI 542, near Ban Pa Miang Mae Hang, Moo. 7, Pagnew Subdistrict, Wieng Pa Pao District. Chiang Mai Province. CTNRC 980504, Doi Inthanon National Park;FMNH 251780–251781, Chiang Mai. Loei Province. QSMI 0273, Phu Luang.

Hebius leucomystax (*n* = 25). **Vietnam**. Gia Lai Province. FMNH 252118–252119, An Khe District; ZISP 23663, Buon Luoi village, 14°20'N-108°36'E, Kannack Town, Ang Khe District, 750 m. Ha Tinh Province. ZFMK 71702, southeastern border of the Ky Anh—Ke Go lowland forest protected area, surroundings 18°00'N-106°06'E, Cam Xuyen District, 125 m asl.; ZFMK 71703, lowland forest bordering Lake Ke-Go, surroundings 17°59'N-106°03'E, Cam Xuyen District, 170 m asl.; ZFMK 71704, southeastern border of Ky Anh—Ke Go Tropical forest protected area, Cam Xuyen District, 270 m asl.; ZISP 23664, Rao An river, 18°20'62"N-105°14'24"E, Son Kim Village, Huong Son District, 300 m. Nghe An Province. ZISP 23665, Khe Kam River, Bu Cam (summit of mountain), 19°37'99"N-105°14'93"E, Chau Nga Village, Ban Man Town, Quy Chau District, 1000 m. Quang Binh Province. MNHN 2006.0447, VNUH 16.6.'05-1, ZFMK 80660, all from the karst forest of Phong Nha-Ke Bang National Park, Bo Trach and Minh Hoa Districts; PNKB RH06213, ZISP 23666, Phong Nha-Ke Bang National Park, 350 m, Bo Trach and Minh Hoa Districts. Quang Tri Province. ZISP 23668–23675, Ban Cup, 16°55'N-106°35'E, Huong Lap Village, Huong Hoa District, 350-480 m. Thua Thien Hue Province. AMNH 154175, Khe Huong, a tributary to Khe Dau (Dau River), 16°18'24"N-107°32'38"E, Binh Thanh Commune, Huong Thuy District, 109 m asl.; IEBR 2314, A Bong Stream, Huong Nguyen Commune, near 16°14'26"N-107°27'11"E, A Luoi District, ca. 152 m.; ZISP 23667, Bach Ma Bang National Park, 500 m, Phu Loc District. **Thailand**. Roi Et Province. THNHM 22201, Nak Prok, Muang Phrai Subdistrict, Selaphum District. No locality. PSUaa 0054, "Thailand".

Hebius 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.

Hebius modestus (*n* = 13). **India**. State of Meghalaya. BMNH 76.2.16.1–2, "Cherra Punji, Khasi Hills", now Cherrapunji; BMNH 1946.1.13.40–41 (Syntypes), Khasi Hills; ZSI 4276, "Cherrapunji, Assam"; ZSI 15263, "Assam", no specified locality. **Myanmar**. Kachin State. BMNH 1925.4.2.16, "Hutong, Bhamo District"; BMNH 1925.9.17.2, BMNH 1925.12.22.22–23, "Huton, Kachin Hills", now Hutung, Kachin Hills, Bhamo District. Shan State. MNHN 1893.0400, "Mts Carin, 1200–1300 m", now Mts. Karen, locality specified by Boulenger (1893b: 322) as "Thao, District of Karin Biapo", now Tahò, 19°23'N-96°54'E, Tauggyi District in extreme south-western Shan State. **People's Republic of China**. Yunnan Province. CAS 234262, Fangma Qiao River, 15–16 km from Longshan (Longling County, Baoshan Prefecture), 24°32'38.1"N-98°38'49.2"E, Mangshi County, Dehong Dai and Jingpo Autonomous Prefecture, 1,140 m a.s.l.; KIZ 75II0238, Tongbiguan, Yingjiang County,Dehong Dai and Jingpo Autonomous Prefecture.

Hebius octolineatus (*n* = 52). **People's Republic of China**. Yunnan Province. AMNH 21022, AMNH 21024, "Lichiang-fu, 8500 ft", now Lijiang Autonomous County, Lijiang Prefecture-level City; AMNH 21050, AMNH 21051, "Yunnan: Tengyueh", now Tengchong County, Baoshan Prefecture; 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 District, Kunming Prefecture; 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"; NMW 22486:1–13, "Yungning, Yung Pe, Likiang, Yunnan, S. China", now in Lijiang Autonomous County, Lijiang Prefecture-level City; ZMB 65438–654441, ZMB 65571, ZMB 65576, ZMB 65579, ZMB 65582–655584, "Talifu W-Yunnan", now Dali County. Sichuan Province. MNHN 1912.0267–0271, "Mienning (2000 mètres)", now Mianning County (28°35'N-102°11'E). Guizhou Province. SMNH 2527, Yin River, Fanjing Shan, Hengyuanzi, 1,800 m. No precise locality. MNHN 1905.0289, MNHN 1907.0012, "Chine".

Hebius parallelus (*n* = 9). **India**. State of Sikkim (?). BMNH 1946.1.13.53 (lectotype of *Tropidonotus parallelus* Boulenger), "Sikkim". State of Meghalaya. BMNH 1946.1.12.83–84, BMNH 1946.1.13.48 (3 former syntypes of *Tropidonotus parallelus* Boulenger, 1890), "Khasi Hills"; ZSI 3852, "Shillong"; ZSI/ERS 112, ZSI/ERS 205, ZSI/ERS 2785, ZSI/ERS 3076–3077, Risa Colony, Shillong; ZSI/ERS 272, ZSI/ERS 9059, Tripura Castle Road, Shillong; ZSI/ERS 450, ZSI/ERS 970, Fruit Garden, Shillong; ZSI/ERS 3253, Mawlai, East Khasi Hills District; ZSI/ERS 8262, Mawphlang, East Khasi Hills; ZSI/ERS 9060, Selbelgiri, Garo Hills.State of Nagaland. Unpreserved specimen (Fig. 14–15), near the Tragopan

Sanctuary (25.63549N-094.01261E), Khonoma. No locality. ZSI 4397, "Madras Hills", obviously in error.

Hebius popei (*n* = 2). **People's Republic of China**. Guangxi Zhuang Autonomous Region. KFBG 4.VIII.1999, Dawangling. **Vietnam**. Vinh Phuc Province. ZISP N-155, Tam Dao.

Hebius sauteri (*n* = 8). **People's Republic of China**. Guizhou Province. MNHN 1912.0327–0328, "Kouy-Tchéou", no locality. Hainan Province. KFBG 27.V.1999, Dialuo Shan. **Vietnam**. Vinh Phu Province. MNHN 1908.0011, MNHN 1935.0066–0067, MNHN 1935.0454–0455, "Tam Dao, Tonkin", now Tam Dao Hill Station.

Hebius sanguineus (*n* = 7). **Federation of Malaysia**. *West Malaysia*. State of Pahang. ZRC 2.4034, Cameron Highlands, 5500 ft.; ZRC 2.4035, Renglet, Cameron Highlands, 3000 ft.; ZRC 2.4036, ZRC 2.4039, Cameron Highlands; ZRC 2.4038, Telon Valley, Cameron Highlands. State of Selangor. ZRC 2.4037, Gombak Valley; ZRC 2.4040, Dusun Wan, 2000 ft.

Hebius taronensis (*n* = 14). **Myanmar**. *Kachin State*. BMNH 1936.7.4.31, "Nam Ti Valley, Upper Burma", now Ratnamhti (27°35'N, 97°47'E), north of the village of Alangdunhku, at about middistance between Langtao and Nawngmun, Putao District; BMNH 1946.13.55 (holotype), BMNH 1946.1.7.92–97, "Pangnamdin", 27°42'N-97°54'E, now Pannandin, Nawngmun Township, Putao District; BMNH 1974.885-886, "Pangnamdin, 3000 ft, 27°42'N-97°54'E", now Pannandin, Nawngmun Township; BMNH 1946.1.13.44, "Aliwang, Taron Valley", now Alawang (27°42'N, 98°08'E), near Renam, in the valley of the Nam Taron, Putao District; CAS 221298, between Alonga and Ahtonga bridge, 27°16'51.3N, 97°45'31.8E, Machanbaw Township, Putao District; CAS 224426–427: Pannandin Village, Hkakabo Razi National Park, Nawngmun Township, 27°43'28.7"N-97°52'09.5"E, Putao District.

Hebius venningi (*n* = 14). **Myanmar**. Chin State. BMNH 1946.1.21.86 (ex BM 1910.1.4.6; holotype of *Tropidonotus venningi*); BMNH 1946.1.13.42 (ex BM 1910.12.9.1); BMNH 1946.1.13.49, BNHS 1316–1320, "Haka, Chin Hills", now Hakha, 22°38'60N-93°37'0E, Hakha District; CAS 235175, Shawn Khyak stream, near Ahone village, Mindat Township, Mindat District, 21°18'40.3"N, 93°45'31.9"E, 3,255 ft; CAS 233206, Chun Kyone, Hakha Township, Hakha District, 22°46'38.5"N, 93°33'55.7"E, 5,360 ft; CAS 234777, a small stream, Kanpetlet town, northern Kanpetlet Township, Mindat District, 21°11'55.7"N, 94°03'34.0"E, 4,062 ft; CAS 235376–235377, Maw stream, near Myin village, Mindat Township, Mindat District, 21°36'34.8"N, 93°53'07.3"E, 3,040 ft. Naga Self-Administered Zone (or Sagaing Region). CAS 245379, Laung Nguk village, Lahe Township, 26 090'17.8"N, 95 31'17.3"E, 2,857 ft.

Hebius xenura (*n* = 1). **Myanmar**. Rakhine State. CAS 220550, Daung stream, Gwa Township, 17°35.051N-94°40.689E.

Herpetoreas platyceps (*n* = 4). **India**. State of Jammu and Kashmir. MNHN 1988.6484, above Doda, between Makambagi and Ularbagi, Udamphur District, at about 2,800 m; ZMB 7293, "Kashmir". State of Sikkim. FMNH 15827, "Mangpu, Sikkim". State of West Bengal. NMW 22383:5, Darjeeling.

Herpetoreas sieboldii (*n* = 23). **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. **India**. West Bengal. CAS-SU 15973, Darjeeling; NMW 22383:1, NMW 22383:3–4, Darjeeling. **People's Republic of China**. Xizang Autonomous Region. CAS 177474, elev. 2,000–2,100 m, between Chinese check point at Zhangmu (Khasa) (28°07'N-85°59'E) and the Nepal border on the Lhasa-Kathmandu Rd., Xigaze Prefecture; CAS 177672–177673, elev. 2,300–2,500 m, between Chinese check point at Zhangmu (Khasa) (28°07'N-85°59'E) and the Nepal border on the Lhasa-Kathmandu Rd., Xigaze Prefecture.