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Addition of *Liopeltis frenatus* (Günther, 1858) and *Cyclophiops multicinctus* (Roux, 1907) to the herpetofauna of Thailand (Squamata: Colubridae)

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ABSTRACT.– This contribution reports the first records for Thailand of two colubrid snake species, both from the eastern part of the country's northern region. A living specimen of *Liopeltis frenatus* (Günther, 1858) was observed and photographed in submontane forest at an elevation of 1700 m in eastern Nan Province. A fresh and intact road-killed (DOR) specimen of *Cyclophiops multicinctus* (Roux, 1907) was collected in the low hills of eastern Uttaradit Province. The total range of both species is plotted in locality dot maps. The locality and habitat of the new records in Thailand are discussed in biogeographic perspective.

KEY WORDS: distribution, new snake records, northern Thailand, range extensions, Southeast Asia

INTRODUCTION

Until a decade ago, the snake diversity of Thailand's mountainous northern region was poorly explored (Pauwels et al., 2001; 2003) and surveys of the ophiofauna remained restricted to a few, relatively easily accessible areas, most of them in Chiang Mai, Chiang Rai and Lampang provinces (Chuaynkern et al., 2015).

Pauwels et al. (2001) emphasizes the underexploration of the ophidian fauna of the northern region in their report on the first country record of the natricid snake *Xenochrophis punctulatus* (Günther, 1858). This record was believed to originate from western North Thailand, and the authors expected more extensive surveys to reveal new taxa, in particular in the western part of the country. This came true with two new records from Tak Province: *Pareas hamptoni* (Boulenger, 1905), a first country record (Vogel, 2010), and *Dendrelaphis nigroserratus* Vogel, Van Rooijen and Hauser, 2012, a new species (Vogel et al., 2012). Moreover, a new, yet undescribed species of pit-viper in the genus *Protobothrops* Hoge and Romano-Hoge, 1983 was found in Tak's Tha Song Yang and Chiang Mai's Omkoi districts (Sjon Hauser, unpublished data). Also three country records of snakes were reported from the central part of the region (Chiang Mai and Chiang Rai provinces): *Plagiopholis blakewayi* Boulenger, 1893 (Tillack et al., 2006), *Hebius khasiense* (Boulenger, 1890) (Pauwels et al., 2009a) and *Sinonatrix yunnanensis* Rao & Yang, 1998 (Pauwels et al., 2009b). Surprisingly, a rising interest in the snake diversity of the eastern provinces of the region resulted in even more new records: *Paratapinophis praemaxillaris* Angel, 1929 (rediscovered, Murphy et al., 2008), *Ptyas nigromarginata* (Blyth, 1854) (first record, Vogel and Hauser, 2013), *Opisthotropis spenceri* Smith, 1918 (rediscovered, Chuaynkern et al., 2015), *Parafimbrios lao* Teynié, David,

Lottier, Le, Vidal et Nguyen 2015 (first record, Teynié and Hauser, 2017), and *Protobothrops mucrosquamatus* (Cantor, 1839) (first record, Vasaruchapong et al., 2017), all originating from Nan Province. In this paper two more new country records of snakes, both originating from the eastern part of northern Thailand, are reported.

MATERIALS AND METHODS

During the rainy seasons of 2016 and 2017, the author spent several weeks in Nan and Uttaradit provinces, northern Thailand. In early morning and late afternoon hours, roads were searched for fresh road-killed snakes (DORs), while at times living snakes were spotted on the tarmac or in the vegetation at the road edges. At night, a number of selected areas were searched for living snakes by following forest trails on foot or by screening the vegetation along main roads. Relatively intact DORs were photographed, and collected for later examination in detail, and subsequent preservation. Living specimens were photographed, and, occasionally, caught in order to remove them to another place for making more pictures, but always released close to the places of capture. For a detailed description of the methodology see Hauser (2017).

Abbreviations:

NBCA — National Conservation Area; N.P. — National Park; QSMI — Queen Saovabha Memorial Institute, Bangkok.

RESULTS

Liopeltis frenatus (Günther, 1858)

On 16 June 2016, at 18:00 PM just before dusk, a snake was spotted on Highway1256 near the road's highest elevation (1715 m) in Nan's Bo Kluea District. The individual was crossing the road in slow undulating movement. Photographs were made on the spot (Fig. 1A). Due to falling dusk and dense fog the condition for making good pictures was not favorable. Therefore, the snake was caught, and photographed again the next morning. During this session the disposition of the animal was very gentle. It was eventually released at the same spot where it had been collected the previous day. Voucher photographs have been deposited at the Queen Saovabha Memorial Institute in Bangkok (QSMI 1541).

The rather elongate and slender snake was about 45 cm long, the head was rounded and moderately distinct from the neck. The size of the eye was moderate, its diameter distinctly smaller than the distance to the tip of the snout; the iris brownish, the pupil round. The tongue was scarlet.

The upper side of the body was light brown; below the snake was cream. There was a distinct, broad, black postocular streak, which at about a head length behind the head splits up into two black lateral stripes, separated by a cream stripe, while a third more narrow black stripe extended on the flanks adjacent to the ventral shields. The three pairs of stripes were edged with cream and became brown and less distinct more posteriorly (see Fig. 1B and 1C) and finally faded out on the posterior half of the body.

FIGURE 1. A. The specimen of *Liopeltis frenatus* on a mountain road in Nan Province. B. Details of head and neck of the captured specimen. C. The specimen showing the striped pattern.

The characteristics of the head scalation that could be distinguished in the photographs were the relatively large, rounded parietal shields, the divided prefrontals and internasals, and the cream color of the supralabials of which the third and fourth were in contact with the eye.

The striped pattern identified the specimen as *Liopeltis frenatus* (Günther, 1858), while all other characters were in accordance with the description of the species in Boulenger (1894), Sharma (2003, 2007), Das (2010, 2012) and Pham et al. (2015).

Distribution and habitat of *Liopeltis frenatus*

The species is regarded as rare throughout its extensive range from northeastern India, through northern Myanmar and North Laos to northern and central Vietnam. It has been recorded predominantly from mountain forests at high elevations.

India

The syntypes originate from the Naga Hills of eastern India, now Nagaland (locality 1 in Fig. 2); one of them is now at the Zoological Survey of India in Kolkata, the other one has been lost (Das et al., 1998; Wallach et al., 2014). Recently there have been new records from Nagaland (Ao et al., 2004). The species has also been recorded in the Khasi Hills (Wall, 1908), now in Meghalaya State (2 in Fig. 2). It has been reported from Namdapha N. P. (3 in Fig. 2) and Mouling N. P. (4 in Fig. 2), both in Arunachal Pradesh (Pawar and Birand, 2001). More recently, three more specimens were recorded in Namdapha N. P. (Krishna et al., 2012). The species is considered rare in India (Sharma, 2003; 2007).

Myanmar

Wall (1925) considered it a 'rare hill snake' in Burma, that usually occurs above 1300 m. He reported two specimens from Huton (5 in Fig. 2) in the Kachin Hills, Upper Burma. He mentions that the species

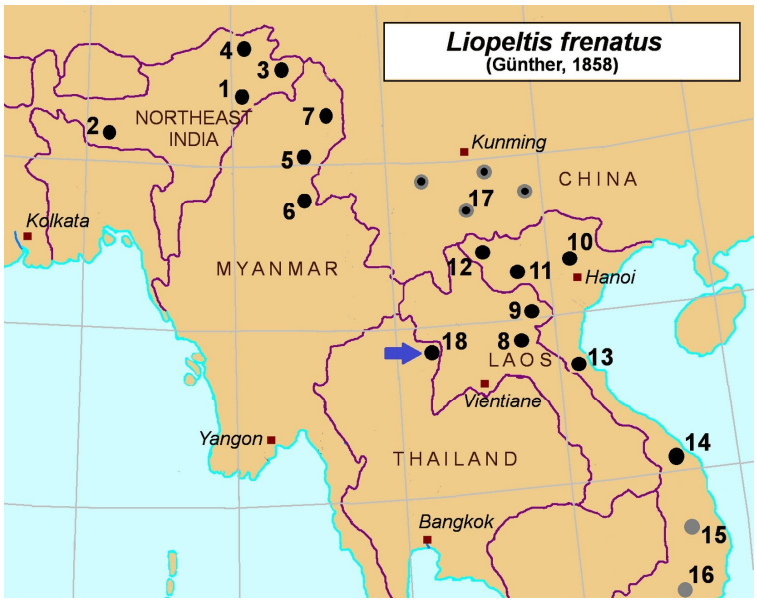

FIGURE 2. Locality dot map for ***Liopeltis frenatus***. 1. Naga Hills, 2. Khasi Hills, 3. Namdapha N.P., 4. Mouling N.P., 5. Huton, Kachin Hills, 6. Mansi, Kachin Hills, 7. Htingnan, 8. Xiangkhong Prov., 9. Houaphan Prov., 10. Tam Dao Range, 11. Son La Prov., 12. Lai Chau Prov., 13. Phong Nha-Ke Bang N.P., 14. Da Nang, 15. Gia Lai Prov., 16. Dong Nai Prov., 17. Yunnan Prov., 18. Nan Prov. The blue arrow points to the new country record in Nan Province. Grey dots represent localities of doubtful records; grey dots with black kernels show locality records that could not exactly be identified.

had been collected previously in Mansi (6 in Fig. 2), also in the Kachin Hills. Smith (1940) reported the snake from a collection taken by Ronald Kaulback in Upper Burma. Twenty-two specimens originated from Htingnan (7 inFig. 2), where it was considered a common snake. Many snakes were caught inside bamboos; in disposition they were very gentle.

Laos

The species was reported from Xiangkhong Province (8 in Fig. 2) in northern Laos by Deuve (1970). Recently, it was recorded in Houaphan Province (9 in Fig. 2), also northern Laos (Teynié et al., 2014).

Vietnam

The snake was reported from the Tam Dao Range (10 in Fig. 2) by Orlov et al. (2000, 2003). Pham et al. (2014) considered it a rare snake in their report on the first provincial record from Son La Province (11 in Fig. 2), mentioning that it has also been recorded in adjacent Lai Chau Province (12 in Fig. 2). Ziegler et al. (2007) and Luu et al. (2013) reported it from Phong Nha - Ke Bang N. P. in Quang Binh Province (13 in Fig. 2) in northern Central Vietnam. According to Smith (1943) it has been recorded in Central Vietnam's Da Nang (14 in Fig. 2). The more southward records in Gia Lai (15 in Fig. 2) and Dong Nai Province (16 in Fig. 2) in southern Vietnam were given in Pham et al. (2014), for which, however, the authors refer to Orlov et al. (2003) who, in fact, question these localities, stating that it is "possible that the indication of *L. frenatus* in South Annam

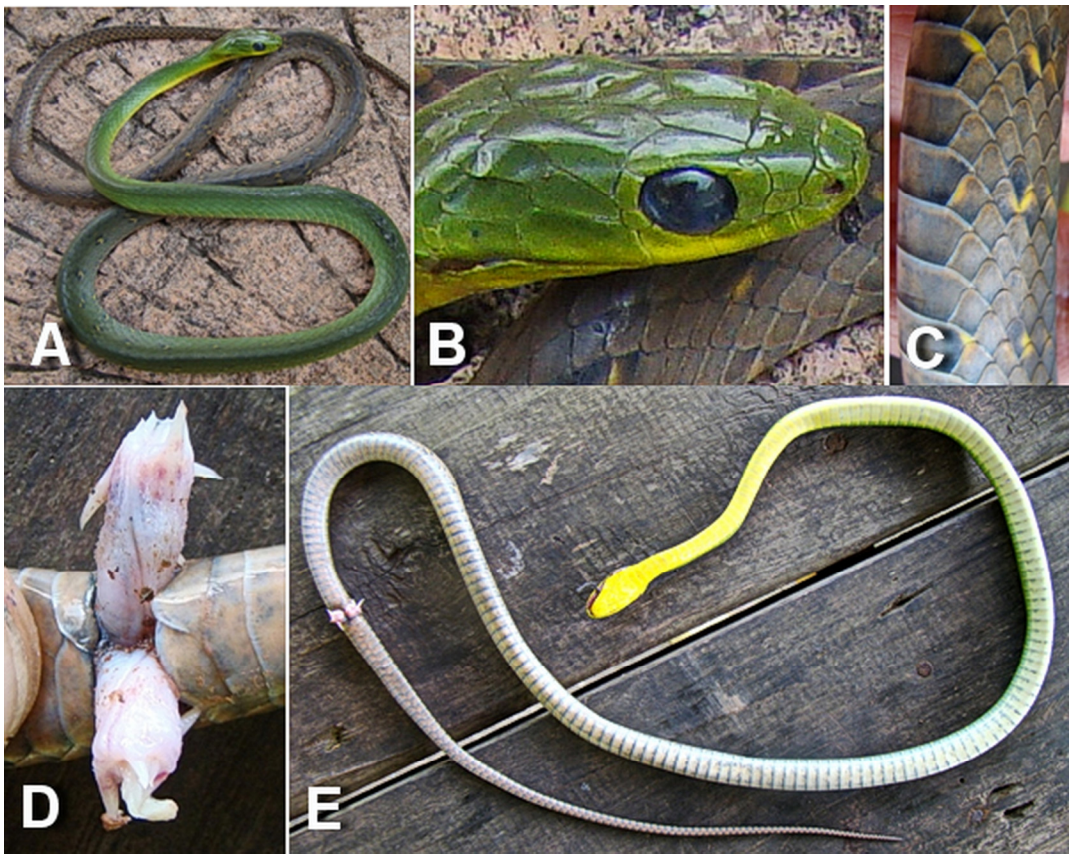

FIGURE 3. A. Dorsal side of the DOR of the *Cyclophiops multicinctus* from Uttaradit Province. B. Details of the head scalation of the same specimen. C. Details of the coloration and pattern on the flanks, showing the rather indistinct, narrow crossbars. D. Everted hemipenes with a few large spines and the divided anal shield. E. Ventral side of the specimen showing the bright yellow color of chin and throat and the light brown peppered with grey belly and the under side of the tail.

[Vietnam] (Smith, 1943: 183; Campden-Main, 1970: 32; Nguyen and Ho, 1996: 86) was referred to another species of *Liopeltis*." As there are no high mountains in Dang Nai, the province seems to be an unlikely locality for *L. frenatus*. Specimens of *L. stoliczkae* (Sclater, 1891) may have been misidentified as *L. frenatus*, as the former has been recorded in South Vietnam's Lam Dong Province, where it was (mis)identified as *Liopeltis* cf *tricolor* (Orlov et al., 2003; Stuart in Bain and Hurley, 2011: 125), and has also been found in nearby Mondolkiri Province in eastern Cambodia (Stuart et al., 2006). The localities Gia Lai and Dang Nai for *L. frenatus* are therefore considered as doubtful.

China

Yang and Rao (2008) reported the species from four counties in Yunnan Province (17 in Fig. 2).

All localities are plotted in Fig. 2 below. The illustration shows that the record from Nan Province (18 in Fig. 2) is an extension of the range of at least 300 km to the west from Xiang Khouang or Houaphan Province

in Laos, which, of the localities hitherto known, are nearest to Bo Kluea in Nan Province. Given the huge range of the species, Nan is not an outlier.

***Cyclophiops multicinctus* (Roux, 1907)**

On 20 May 2017, at 8:30 AM, a fresh and intact DOR (dead on road) snake was found on Highway 1339 near the village of Ban Huai Pong, in the hills of Nam Pat District in Uttaradit Province, about 20 km northwest of the summit of Phu Soi Dao (2102 m) on the Thai-Laotian border. The snake was examined and photographed (Fig. 3A-E) and preserved; it is now in the collection of the Queen Saovabha Memorial Institute in Bangkok (QSMI 1540).

The snake's total length was 1021, the tail length 266 mm (ratio tail length/total length: 26.1 %). The upper side of the head and the anterior half of the body were grass green, becoming light greyish-brown posteriorly with numerous regularly spaced, narrow, pale brown or whitish crossbars (Fig. 3A-C). The chin, throat and anterior part of the belly were yellow, the posterior part pale brown peppered with grey (Fig. 3E). Squeezing and massaging the base of the tail towards the vent resulted in everting both hemipenes; they were adorned with 4-5 large spines arising from the distal part, the largest pointing downwards towards the base (Fig. 3D).

Two preventral scales were counted, 180 ventral shields (excluding the divided anal shield) and 94 pairs of subcaudal scales.

The head was distinct from the neck, the black eyes relatively large and the pupil round. The tongue was black. There were 8 supralabials, the 4th and 5th in orbit, the 6th being the largest. There were 2 postoculars, 1 large preocular, and a small loreal. Prefrontals, internasals and nasals were divided. There were 1 anterior temporal and two posterior temporal shields.

Due to the characteristic coloration and pattern of the skin, the snake could be easily identified as *Cyclophiops multicinctus* (Roux, 1907). The morphometric and meristic data are in accordance with the data given by Roux (1907), Bourret (1935a,b; 1937a,b; 1939a, b), Campden-Main (1970), Phan et al. (2014) and Ziegler et al. (2014) summarized in Appendix 1.

There are a few minor differences. Compared to a male specimen with a tail/total length ratio of 29.4% described in Smith (1943), the ratio of the Uttaradit male is low (26.1%) . For 48 specimens of which the sex was not determined and reported in Bourret (1935a,b; 1937a,b; 1939a, b) the relative tail length ranged from 25-33% . In one specimen (sex unknown) described by Roux (1907) the relative tail length was 23.6%. The relative tail length of the Uttaradit male is within the known total range (23.6-33%) for the species (both sexes). The number of subcaudal pairs of the Thai male is 94, which is low for a male (and in accordance with the relatively short tail), as Campden-Main (1970) gives a range of 103-105 subcaudal pairs for males in southern Vietnam. Nothing can be concluded from these data, it just seems that the Thai specimen has a relatively large body (180 ventral shields is at the upper end of a range of 164-180) and a short tail with a relatively low number of subcaudal pairs (94 — the total range is 72-111).

In none of the desciptions of the species are mentioned a bright yellow chin and throat. However, a photograph of a yellow-throated specimen illustrates Teynié and David (2013) and numerous pictures of similar color morphs have been posted on various internet sites (e.g. the Reptile Database). In a number of snake species of

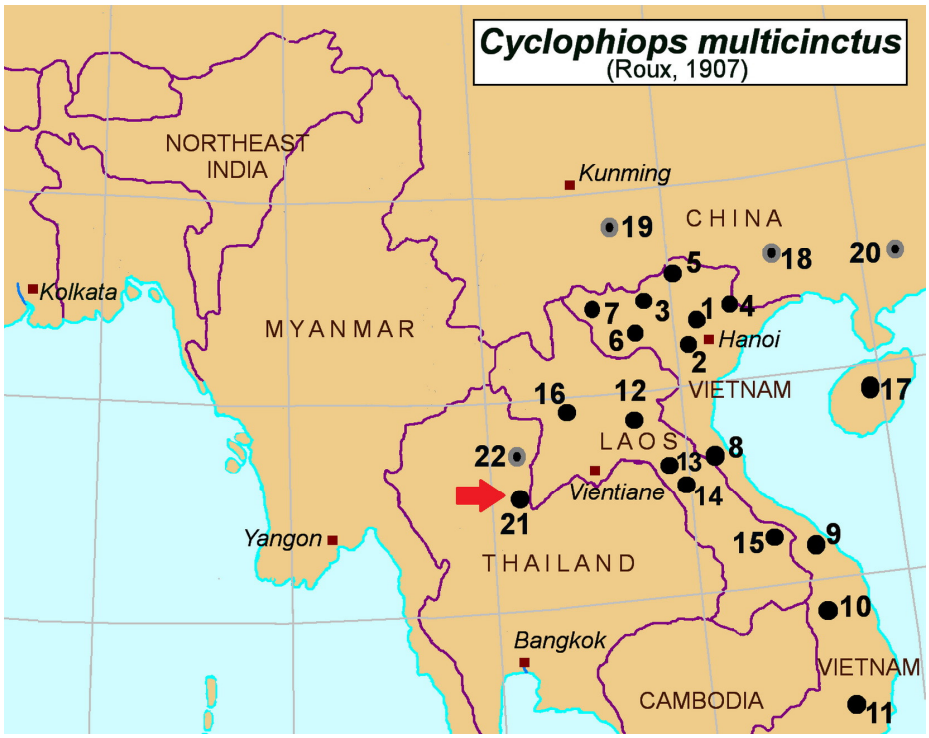

FIGURE 4. A locality dot map for *Cyclophiops multicinctus*. 1. Tam Dao Range, 2. Bavi, 3. Chapa (Sa Pa), 4. Lang Son, 5. Ha Giang Prov., 6. Son La Prov., 7. Lai Chau Prov., 8. Phong Nha-Ke Bang N.P., 9. Da Nang Prov., 10. Kon Tum Prov., 11. Lam Dong Prov., 12. Xiang Khouang Prov., 13. Nam Kading NBCA, 14. Phou Hin Poun NBCA, 15. Xexap NBCA, 16. Louangphrabang Prov., 17. Hainan, 18. Guang Xi Prov., 19. Yunnan Prov., 20. Guang Dong Prov., 21. Uttaradit Prov., 22. Nan Prov. The red arrow points to the new country record in Uttaradit. Grey dots with black kernels show locality records that could not exactly be identified.

which this part of the body is usually cream or whitish, such as *Amphiesma stolatum* (Linnaeus, 1758), *Xenochrophis flavipunctatus* (Hallowell, 1860) and *Dendrelaphis subocularis* (Boulenger, 1888), yellow-throated individuals are common, whereas orange-throated individuals occur in *Sibynophis collaris* (Gray, 1853) of which the throat and chin are usually pale yellow (Sjon Hauser, unpublished data). Such color morphs are perhaps seasonal and this may also be the case for the Uttaradit specimen of *C. multicinctus*.

Distribution and habitat of *Cyclophiops multicinctus*

Vietnam

Northern Vietnam. The type locality of the *Ablabes multicinctus* is "Tonkin" — present-day northern Vietnam (Roux, 1907; Wallach et al., 2014). In the 1930s, many specimens originating from mountain localities were sent to René Bourret and listed and briefly described by him in a series of articles (Bourret, 1935a,b; 1937a,b; 1939a, b). These localities, all hill stations, are Tam Dao (locality 1 in Fig. 4) at 900 m, 80 km north of Hanoi in Vinh Phu Province;

Bavi (2 in Fig. 4) at 400 m, 60 km west of Hanoi, in Vinh Phu Province; Chapa (Sa Pa) (3 in Fig. 4) at 1500 m near the Chinese border in Lao Cai Province, northwest of Hanoi, and Lang Son (4 in Fig. 4) at 1200 m, also near the Chinese border, in Lang Son Province, northeast of Hanoi (Bourret, 1939c). According to Bourret the snake was "very common in parts with vegetation and forest" (Bourret, 1939d). More recently, it was reported again from Tam Dao where "it occurs in mountain regions, frequently found in trees overhanging streams; 300-1500 m" (Orlov et al., 2000). The snake was also spotted in Ha Giang Province (5 in Fig. 4) in the very north of the region (Ziegler et al., 2014), and another specimen was collected in Son La Province (6 in Fig. 4) at 1260 m (Pham et al., 2014). According to Nguyen et al. (2009) it is known from Lai Chau Province (7 in Fig. 4) as well.

Central Vietnam (formerly Annam). "North-Annam" was considered as another region where the snake was very common (Bourret, 1939d). The species was listed for the Phong Nha-Ke Bang N. P. in Quang Binh Province (8 in Fig. 4) by Ziegler et al. (2007) and Luu et al. (2013). It was reported to occur on the Col des Nuages in Da Nang Province (9 in Fig. 4) by Smith (1943) and Campden-Main (1970) and was reported from Kon Tum Province (10 in Fig. 4) by Nguyen et al. (2009).

Southern Vietnam. According to Smith (1943) the range of the species stretches as far south as the Langbian Plateau (Da Lat Plateau) in Lam Dong Province (11 in Fig. 4), 150 km northeast of Ho Chi Minh City.

Laos

The snake is known from the "Tran-ninh Plateau" in Xiang Khouang Province (12 in Fig. 4), northern Laos (Smith, 1943; Deuve, 1970). Bourret (1939d) considered it a common snake in "Upper Laos" (northern Laos). Only recently, the species has been recorded again in at least seven different localities throughout the country. Teynié and David (2013) reported it from Nam Kading NBCA (National Biodiversity Conservation Area) in Bolikhamxay Province (13 in Fig. 4) and Phou Hin Poun NBCA in Khammouane Province (14 in Fig. 4), both in Central Laos. In South Laos, Thomas Calame recorded it in Xexap NBCA in Saravan Province (15 in Fig. 4) (Alexandre Teynié, per. com.). It is also known to occur in four different localities 10-60 km south of the city of Louangphrabang in Louangphrabang Province (16 in Fig. 4). Interestingly, in three of these localities the specimen was spotted during the short timespan of three days in mid-September 2017 (Alexandre Teynié, per. com.).

China

According to Smith (1943) the species is known to occur in Hainan (17 in Fig. 4) and Guang Xi (18 in Fig. 4). Yang and Rao (2008) listed four different "counties" in southern Yunnan where the species has been recorded (19 in Fig. 4), and Xiao et al. (2010) recently reported it from Guang Dong Province (20 in Fig. 4).

Thailand

In Thailand the species has been recorded in Nam Pat District (21 in Fig. 4), Uttaradit Province (this paper). An unconfirmed record was reported from Nan Province (22 in Fig. 4)—see Discussion.

All known localities are plotted in Fig. 4. They show that the new Thai record extends the range of the species at least 300 km southwest from Louangphrabang Province, which is the locality nearest to Nam Pat, Uttaradit. However, given its known distribution, this location is not really an outlier or unexpected.

DISCUSSION

Liopeltis frenatus

This species is rare throughout its range and is usually found in forested mountain areas at high elevations, above 1300 m in India and Myanmar (Wall 1925), at 1460 m and 1510 m in northern Vietnam's Son La Province (Pham *et al*. 2014) and at 1400 m in Houaphan Province in northern Laos (Teynié et al. 2014). Only in a report on snakes collected at Htingnan in the Kachin Mountains of Myanmar (at 1200-2000 m), is the snake considered "common in the neighbourhood" (Smith 1940).

The here reported new country record also originates from a high elevation (1700 m), where the habitat consists of "lower montane forest" (Santisuk, 1989), locally known as "ancient forest" due to the occurrence of an endemic Fish-tail Palm and the flowering tree *Bretschneidera sinensis*, a relict species only known from a few sites at much higher latitudes in China and Vietnam (Santisuk 1989; Gardner et al. 2000). As has been discussed in Ziegler et al. (2008), such mountain areas could have served as cool, humid refuges for numerous species, including snakes, during the last glaciations when habitats at lower elevations became dryer. This is supported by records in Doi Phu Kha N. P. of the colubrid snake *Ptyas nigromarginata* (Blyth, 1854), a rare snake best known from the Himalayan foothills in northeast India, northern Myanmar and southern China (Vogel and Hauser 2013). Based on the presently known distribution of *Liopeltis frenatus*, Doi Phu Kha was likely a refuge for the species during dryer ages. Whereas *Ptyas nigromarginata* is now known from five specimens, all originating from the Doi Phu Kha N. P. in Nan Province (Sjon Hauser, unpublished data), there is only a single record of *L. frenatus*. This paucity of records may be explained from the latter's much smaller size and from habits that make it perhaps difficult to spot. Orlov et al. (2003) emphasizes that the extremely rare repetition of records of some species, snakes in particular, is a characteristic of the tropical fauna. Some species are only known from a single specimen, and some, fossorial snakes in particular, are difficult to find. This may be true for the probably semifossorial snake *Parafimbrios lao* Teynié, David, Lottier, Le, Vidal et Nguyen 2015, a species so far only known from four localities in mainland Southeast Asia, including Doi Phu Kha N. P. (Teynié and Hauser 2017).

Cyclophiops multicinctus

Most specimens throughout the species' currently known total range originate from mountainous areas at 900-1400 m. However, there are also numerous records from lower elevations. For example, many specimens were collected at hill stations in northern Vietnam at 500-1000 m. At Tam Dao, the elevational range of the species is given as 300-1500 m (Orlov et al. 2000). The collecting site of the Thai specimen in Uttaradit Province is at 365 m; the habitat consists of deciduous and mixed forest, much of which has been cleared over the past twenty years for the cultivation of corn, pineapples and para rubber. The surrounding (low) hills are unlikely to have served in the past as a cool and wet retreat for species in the sense outlined above for the higher areas of Doi Phu Kha N. P. in Nan, but Phu Soi Dao Peak (2102 m), at 20 km from the collecting site, could have been such a refuge. However, it seems more likely that the late discovery of *Cyclophiops multicinctus* is due to the herpetological underexploration of eastern North Thailand. Evidence for our extremely poor knowledge

of its snake fauna is indirectly given in the authoritative work by Cox et al. (2012) in which only nine snake species are recorded for Nan, and ten for Uttaradit Province. Other evidence is the picture of a road-killed snake from "Nan province" that was recently posted as "unidentified" on the website www.siamensis.org, to be identified as *Cyclophiops multicinctus* later. If confirmed as a valid record, it implies that the species may be widespread in eastern North Thailand.

CONCLUSION

The new additions to Thailand's snake fauna reported in this contribution underscore that large parts of northern Thailand are herpetologically underexplored. More new country records are to be expected, in particular in the eastern part of the region with its cool mountain refuges and its close affinities to the relatively little known fauna of northern Laos. Over the past 15 years, the number of snake species known from Laos has almost doubled (Teynié et al. 2017), many of the new additions originating from the North and including rare and spectacular species, such as *Euprepiophis mandarinus* (Cantor, 1842) and *Azemiops feae* Boulenger, 1888 (Teynié et al. 2017). When Thailand's northern region is to be surveyed more intensively, similar discoveries may be expected sooner or later.

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APPENDIX

Data of the *Cyclophiops multicinctus*-specimen from Uttaradit Prov., northern Thailand, compared to data in various sources.

	QSMI 1540 (this paper)	Roux (1907)	Bourret (1935-39)*	Smith (1943)	Campden-Main (1970)	Pham et al. (2014)	Ziegler et al. (2014)
origin	Thailand	N Vietnam	N Vietnam	tot. range	S Vietnam	N Vietnam	N Vietnam
head	moderately distinct	narrow, indistinct, snout long	-	distinctly convex, snout more pointed	distinct, 2 x longer than broad	moderately distinct	-
loreal	1 (small)	1	-	-	1 (pit absent)	1	1
preocular	1	1 (large)	-	-	1	1	1
postocular	2	2	-	-	2	2	2
ant. temporal	1	1	-	-	1	1	1
post. temporal	2	2	-	-	2	2	2
supralabials	7	7	-	7 (some 8)	7 (rarely 8)	7	7
in orbit	4 and 5	4 and 5	-	-	4 and 5	4 and 5	4 and 5
infralabials	-	-	-	-	5 or 6	6	-
contact chin shield	-	1 to 4	-	-	-	1 to 4	1 to 4
internasals	divided	-	-	-	2	-	-
prefrontals	divided	-	-	-	2	-	-
nasal	single	divided	-	-	single	single	-
sex	1 male	-	48 males & fem.	males & fem.	males & fem.	1 fem.	-
ratio tail length : total length	26.10%	23.60%	25-33%	male: 29.4% fem.: 29.3%	-	-	-
dorsal scales	smooth	smooth	-	smooth	smooth or faintly keeled	-	-
ventral shields	180	168	166-196	164-177	males: 168-172 females: 164-177	180	-
anal shield	divided	divided	usually divided	-	divided	-	-
subcaudal pairs	94	98	83-111	72-103	males: 103-105 females: 72-110	93	-
Dorsal Scale Formula	15:15:15	15 rows	-	15:15:15	15:15:15	15:15:15	-
dorsum-pattern	narrow pale crossbars	-	-	posteriorly crossbars	crossbars posteriorly	-	-
hemipenes	a few large spines	-	-	rel. large spines, few	-	-	-

* Combined data from Bourret (1935a,b; 1937a,b; 1939a,b)