



Confirmation of the Worm-eating Snakes, *Trachischium tenuiceps* and *Trachischium fuscum* (Serpentes: Colubridae: Natricinae), from Bhutan

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The genus *Trachischium* Günther 1858 comprises seven currently recognized species, *T. fuscum* (Blyth 1854), *T. guentheri* Boulenger 1890, *T. laeve* Peracca 1904, *T. monticola* (Cantor 1839), *T. sushantai* (Raha et al. 2018), *T. tenuiceps* (Blyth 1854), and *T. apteii* (Bhosale et al. 2019). These fossorial worm-eating snakes are endemic to the eastern Himalayan region and are known to occur in India, Nepal, Bhutan, and China (Smith 1943; Zhao 2006; Chettri et al. 2009). Due to the cryptic nature and nocturnal behavior of these snakes, records are spotty, as is knowledge of morphological variation, natural history, and distributions.

Of the seven species, three (*T. tenuiceps*, *T. laeve*, and *T. guentheri*) have been reported from Bhutan (Bauer and Günther 1992; Mitra 2009; Wangyal 2014). The occurrence of *T. guentheri* in Bhutan was reported by Bauer and Günther (1992) based on the specimens collected by the 1972 expedition of the Basel Natural History Museum. However, authors did not provide voucher photographs or morphological descriptions of the referenced specimen. Likewise, an unconfirmed species of *Trachischium*, which Wangyal (2014) referred to as *Trachischium* cf. *laeve*, was reported without vouchered specimens or locality data. The occurrence of *T. tenuiceps* in Bhutan was first reported by Mitra (2009) based on an observation of a single individual from Kanglung in eastern Bhutan. Although the author presented a brief morphological description, he did not provide photographs. In the absence of vouchered specimens and detailed descriptions, the questionable records of *T. laeve* and *T. guentheri* reported by Wangyal (2014) and Bauer and Günther (1992) from Bhutan require further confirmation because snakes in this genus share many similar morphological characters that can easily lead to the misidentification of species.

Initially, *T. fuscum* was described as *Calamaria fusca* by Blyth (1854). In 1864, Günther synonymised *C. obsurostrata* with *T. fuscum*. Subsequent taxonomists (e.g., Boulenger

1890, 1893; Smith 1943) followed the taxonomic assignment of Günther and all of them treated the species under the genus *Trachischium* (Raha et al. 2018). *Trachischium fuscum* is a montane snake found at elevations of 920–2,590 m asl (Wallach et al. 2014). Historical references (e.g., Günther 1860; Boulenger 1893; Annandale 1904; Wall 1909; Smith 1943) suggest that *T. fuscum* was known to be found in India, Nepal, and Bhutan. Wangyal et al. (2020) reported *T. fuscum* as a new record for Bhutan based on a photograph, but no evidence of its presence has been confirmed. Herein, I present records of *T. fuscum* and confirm the presence of *T. tenuiceps* in Bhutan based on newly collected specimens, and provide the first detailed morphological description, diagnostic key, and distribution of this species in Bhutan.

Five snakes in the genus *Trachischium* were collected from two localities in Bhutan (Fig. 1). Because no standard system in the country exists to assign e-voucher numbers, specimens were designated with field numbers. Vouchered specimens were compared with information in Raha et al. (2018) and



Fig. 1. Locations of confirmed records of Yellow-bellied Worm-eating Snakes (*Trachischium tenuiceps*) (red dot) and a Darjeeling Slender Snake (*T. fuscum*) (green dot) in Bhutan.



Fig. 2. An unsexed adult Darjeeling Slender Snake (*Trachischium fuscum*) (CNRSS 2017525). Photographs by Sunil Sapkota.



Fig. 3. An adult female Yellow-bellied Worm-eating Snake (*Trachischium tenuiceps*) (TFDS 20197). Photographs by B.K. Koirala.

Wang et al. (2019). Apart from snout-vent length (SVL) and tail length (TaL), which were made with a flexible ruler to the nearest 1 mm, all other measurements were made with a digital slide caliper to the nearest 0.1 mm. A dissecting binocular microscope was used to examine meristic characters.

One unsexed Darjeeling Slender Snake (*Trachischium fuscum*) (CNRSS 2017525) (Fig. 2), collected by S. Sapkota and D.B. Gurung in May 2017 from Thinleygang, Thimphu District, Bhutan (27.50478 N, 89.7905 E; elev. 2,100 m asl), was deposited in the Laboratory of the College of Natural Resources, Lobesa Royal University of Bhutan, and four Yellow-bellied Worm-eating Snakes (*T. tenuiceps*) (Fig. 3) (TFDS 201910 [male], TFDS 20197 [female], TFDS 201911 [female] from Khaling County, eastern Bhutan [27.13104 N, 91.56719 E; elev. 2,075 m asl], and TFDS 201915 [female], from Rangun, Trashigang, eastern Bhutan [27.35727 N, 91.65124 E; elev. 1,400 m asl]), collected by the author in October 2019, were deposited in Doksum Forest Range Office, Trashigang Forest Division. All agree with the diagnosis of the genus by possessing the following

characters: (1) head indistinct from neck; (2) body cylindrical; (3) eye moderate, with rounded or vertically sub-elliptical pupil; (4) 13 or 15 dorsal scale rows throughout; (5) dorsal scales without apical pits; (6) smooth and metalescent scales; (7) ventrals rounded; (8) tail short; and (9) subcaudals paired (Boulenger 1890, 1893; Smith 1943).

Morphological characteristics of vouchered specimens were compared with descriptions in Raha et al. (2018) and Wang et al. (2019) (Table 1) and measurements and scale counts for the four specimens of *T. tenuiceps* are provided in Table 2.

The single *T. fuscum* was encountered during daytime under thick leaf litter. Surrounding vegetation is cool broadleaf forest dominated by *Castanopsis* sp., *Schima* sp., *Macaranga* sp., and *Alnus nepalensis*. Little is known about reproduction and diet, although these snakes probably feed on earthworms and other fossorial prey. Associations with other species of snakes at this locality is unknown.

All four *T. tenuiceps* were encountered during daytime, three were beneath a pile of leaves in agricultural land and

Table 1. Comparisons of Yellow-bellied Worm-eating Snakes (*Trachischium tenuiceps*) and a Darjeeling Slender Snake (*T. fuscum*) from Bhutan with data from the literature (Raha et al. 2018; Wang et al. 2019). Dashes (—) indicate missing data. Abbreviations: SVL: snout-vent length; ToL: total length; TaL: tail length; HL: head length (tip of snout to posterior end of last supralabial); HW: head width (widest section of the head at posterior margin of parietals); HH: head height (measured at HW); ED: horizontal diameter of eye; SnL: Snout length (tip of snout to anterior edge of eye); PtO: post-ocular; PrO: pre-ocular; DSR:M:V: dorsal scale rows (DSR) one head-length behind head, at midbody (M), and one head-length anterior to the vent (V); VEN: ventrals, counted following Dowling (1951) (number of scales beginning with the third ventral scales, leaving two pre-ventrals immediately posterior to the gulars, to the vent but excluding cloacal plate); CP: cloacal plate; SC: subcaudals, excluding the tail tip; SL(R/L): supralabials (right/left); TEMP(R/L): temporals (right/left); PF: prefrontal(s).

Characters	<i>Trachischium tenuiceps</i>		<i>Trachischium fuscum</i>	
	Vouchers	Literature Records	Vouchers	Literature Records
SVL	215–255	294–320	325	95–400
ToL	263–327	344–370	389	—
TaL	48–72	50–50	64	17–66
TaL/SVL	0.21–0.28	0.15–0.17	0.19	—
TaL/ToL	0.17–0.22	0.15–0.18	0.16	0.13–0.18
PF	2	2	1	½
PrO	1	1	1	1
PtO	2	2	1	1
SL(L/R)	6/6	6/6	6/6	6/6
Lo	1	1	1	1
SL touching eye	3rd & 4th	3rd & 4th	3rd & 4th	3rd & 4th
VEN	134–142	125–140	143	140–169
DSR:M:V	13:13:13	13:13:13	13:13:13	13:13:13
SC	36–44	28–42	35	28–44
TEMP(R/L)	1+2/1+2	1+2/1+2	1+2/1+2	1+2/1+1
CP	Divided	—	Divided	Divided
Ventral color	Yellow	Yellow	Black	Brown to black

Table 2. Morphometric data (in mm except where noted) of Yellow-bellied Worm-eating Snakes (*Trachischium tenuiceps*) from Trashigang, eastern Bhutan. Abbreviations as in Table 1.

Characters	TFDS 20197	TFDS 201910	TFDS 201911	TFDS 201915
Sex	F	M	F	F
SVL	255	255	215	215
ToL	310	327	263	263
TaL	55	72	48	48
TaL/SVL	0.21	0.28	0.22	0.22
TaL as % ToL	17.74	22.01	18.25	18.25
HL	7.1	8.0	6.5	7.0
HW	5.4	5.5	5.3	5.3
HH	4.2	4.7	4.0	4.0
SnL	2.8	3.0	2.7	3.0
ED	1.6	1.2	1.2	1.2
TEMP	1+2	1+2	1+2	1+2

one was excavated from a maize field. Surrounding vegetation is cool broadleaf forest dominated by *Quercus griffithii*, *Castanopsis* sp., *Schima* sp., *Pinus bhutanica*, and *Alnus nepalensis*. As for *T. fuscum*, little is known about reproduction and diet but these snakes likely also feed on earthworms and other fossorial prey. According to local residents, these snakes are not uncommon in agricultural fields from pre-monsoon to early autumn when they are generally encountered while digging the field for planting. Other species of snakes occurring in this specific locality are *Ovophis monticola*, *Pseudoxenodon macrops*, *Elaphe cantoris*, and *Ptyas korros*.

Biogeographic elements and climatic conditions in the Bhutan Himalayas are similar to those of the eastern Himalayan locations from where most species of *Trachischium* have been reported and where Wall (1909) documented the co-existence of three species (*T. fuscum*, *T. guentheri*, and *T. tenuiceps*). Because elevational ranges of many species of *Trachischium* overlap considerably, although the preferred elevation for each species might differ (Raha et al. 2018), the discovery of additional species in Bhutan remains a possibility. In any case, these newly collected specimens from Bhutan confirm the records of *T. fuscum* and *T. tenuiceps* in Chettri et al. (2009), Mitra (2009), and Wangyal (2014). However, further herpetological studies are needed to corroborate the still-questionable records of *T. guentheri* and *T. leave* in Bhutan.

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