New occurrence of *Sinovipera sichuanensis* in Guizhou

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Abstract: Three Asian green pit vipers were collected in August 2013 during a field trip in Fanjin Mt. National Conservation Area, Guizhou. These specimens were identified as *Sinovipera sichuanensis*, based on subsequent examination and comparison. This is a new record of the genus *Sinovipera* and *S. sichuanensis* in Guizhou, and the first time that male specimens have been collected in the field.

Keywords: Snake; Hemipenis; Distribution; Morphology

During a field trip to Fanjing Mt. National Conservation Area in August 2013, three male specimens of the Asian green pit viper were collected at Jiangkou County, which were later identified as *Sinovipera sichuanensis* (Guo & Wang, 2011). This is the first time that *S. sichuanensis* has been found outside the type locality (Hejiang County, Sichuan), and also the first time that male samples have been collected in the field. We record and describe them in this paper. All specimens (YBU13226−28) were deposited in the Zoology Diversity and Evolution Lab of Yibin University.

EXTERNAL MORPHOLOGY

The following description is based on the specimens YBU13226, YBU13227, and YBU13228.

All three specimens collected are male. The body is elongated, cylindrical, and stout. Total body length (TL) ranges from 865 mm to 920 mm; snout-vent length (SVL) ranges from 690 mm to 740 mm; tail length (TAL) ranges from 165 mm to 180 mm. Head is distinctly triangular and elongated, distinct from the neck. Dorsal body is nearly uniformly green, lacking postorbital and ventrolateral stripes; the upper lips are slightly lighter. The tail is distinctly prehensile, with one quarter to one third of the TAL rusty red dorsally. Below the head, the body and tail are yellow white; the eye is deep red and the pupil is vertical.

The top of the head is covered with small scales; supraoculars are the largest paired scales. There are 11-12 small scales between the supraoculars. Internasals are separated by one small scale, and do not touch the rostral. The rostral is trapeziform and invisible from above. Supraoculars are bordered by 7−10 small scales (excluding postoculars and preoculars). There are three elongated preoculars, the middle and lower ones and the third supralabial forming the border of the pit cavity. Postoculars 3 or 2, the lowest one elongated and extending beyond the eye, the subocular one elongated and forming the lower edge of the eye. Supralabials 9 or 10 on both sides; the first separated from the nasal by a distinct suture; the second is the highest, forming the anterior border of the pit cavity and separated from the nasal by two small vertically arranged scales; the third is the largest, separated from the eye by an elongated postocular; the fourth supralabial is separated from the eye by three scales, with the upper two in line. Infralabials 11−14, the first pair elongated and contacted after the mental. One pair of chin shields,

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contacting with the first three pairs of infralabials. There are 5−7 small scales in a line between the first preventral and the chin shields. Body scales feebly keeled except the outer two to three rows.

Ventrals 170−179; anal entire; dorsal scales 21-21-15 rows. Body scale reduction from 21 to 19 rows (21/19VS), from 19 to 17 rows (19/17VS), and from 17 to 15 rows (17/15VS) occurs at the 107th, 114th, and 123rd ventral positions, respectively. Subcaudals 68−74 pairs; scale reduction from 8 to 6 rows (8/6SC) and from 6 to 4 rows (6/4SC) occurs at the 11th and 28th subcaudals, respectively.

The retracted hemipenis is forked at the 4th to 5th subcaudal, extending to the 7th to 8th subcaudal plates. Sulcus is prominent, forked at the 2nd subcaudal, extending to the tips of the organ. The base of the organ is covered with tiny spines, but change to larger hard spines gradually. It is calyculate distally, without spines. The demarcation between spines and calyces is distinct but does not extend in a straight line across the organ.

The specimens were collected in two close locations beside streams in an evergreen forest at an elevation of 878 m (N27°59', E108° 46'), with two specimens found beside a large stone at about 2000h after rain.

DISCUSSION

Sinovipera sichuanensis was initially described based on two females from Hejiang, Sichuan, in 2011 (Guo & Wang, 2011). It has not been found in other localities previously. The occurrence of *S. sichuanensis* in Jiangkou, Guizhou, not only expands it distribution, but the collection of males provides further diagnostics data.

After a morphological comparison between the three males collected from Guizhou and the two females from the type locality, we found these specimens showed a very similar external morphology including scalation and color. For example, they were uniformly green in body, without postorbital and ventrolateral stripes; the ventrals and subcaudals did not vary significantly; they has similar dorsal (21/19VS, 19/17VS, 17/15VS) and subcaudal (8/6SC, 6/4SC) scale reduction patterns (Table 1). Based on the five specimens, however, the females were obviously longer than the males. The SVL of the two females was up to 1 010 mm, while the longest male was 740 mm. Due to the small number of samples, we cannot be sure whether the differences between the two sexes are significant, or whether they are the result of sexual polymorphism.

Table 1 Morphological comparison of *Sinovipera sichuanensis*

Specimens	YBU13226	YBU13227	YBU13228	YBU071077	YBU030116
Locality	Guizhou	Guizhou	Guizhou	Sichuan	Sichuan
Sex	Male	Male	Male	Female	Female
SVL (mm)	740	690	700	900	1010
TAL (mm)	180	175	165	180	210
Ventrals	170	179	172	172	171
Subcaudals (pairs)	68	74	70	66	68
Preoculars	2	2	2	3	1
Postoculars	2/3	2/3	2	3	2/3
Supralabials	10	9/10	10	10	10/12
Infralabials	11/12	12/14	12/13	13	14/13
21/19VS	105	106	110	104	109
19/17VS	113	111	117	114	115
17/15VS	−	118	127	126	136
8/6SC	12	9	11	11	12
6/4SC	26	23	33	33	39
References	This study	This study	This study	Guo & Wang, 2011	Guo & Wang, 2011

Sinovipera sichu-anensis and *Viridovipera stejnegeri* are sympatric in Hejiang and Jiangkou; however, there are several external morphological differences between them: 1. lateral stripes are absent in *S. sichuanensis* (Figure 1, Figure 2), but red and/or white stripes are present in *V. stejnegeri* (David et al, 2002; Zhao, 2006) (Figure 3); 2. *S. sichuanensis* is obviously larger than *V. stejnegeri* in body size. The largest *V. stejnegeri* is about 625 mm in males and 765 mm in females (David et al, 2001, 2002), while the largest male of *S. sichuanensis* is 920 mm and the largest female is 1 220 mm in total body length.

On the basis of retracted hemipenis morphology, that is, deeply forked, spinous proximally and calyculate distally, *Sinovipera sichuanensis* appears similar to snakes of *Viridovipera* but distinctly different from *Cryptelytrops*

Figure 1 General view of adult male *Sinovipera sichuanensis* from Jiangkou, Guizhou

Figure 2 Holotype of *Sinovipera sichuanensis* (female) from Hejiang, Sichuan

Figure 3 Adult male *Viridovipera stejnegeri* from Jiangkou, Guizhou

albolabris (Guo & Zhang, 2001). Whether the similarity between *S. sichuanensis* and *Viridovipera* species indicates they have a close relationship might be resolved by further molecular phylogeny research.

In the description of *Sinovipera sichuanensis*, Guo & Wang (2011) predicted the possibility that this species inhabited Chongqing and Guizhou, and its occurrence in Jiangkou, Guizhou, confirmed this speculation. With further study and extensive sampling, *S. sichuanensis* may be found in more localities between Hejiang and Jiangkou.

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References

David P, Vidal N, Pauwels OSG. 2001. A morphological study of Stejneger's pitviper *Trimeresurus stejnegeri* (Serpentes, Viperidae, Crotalinae), with a description of a new species from Thailand. *Russian Journal of Herpetology,* **8**: 205-222.

David P, Vogel G, Pauwels OSG, Vidal N. 2002. Description of a new species of the genus *Trimeresurus* from Thailand, related to *Trimeresurus stejnegeri* Schmidt, 1925 (Serpentes, Crotalidae). *Natural History Journal of Chulalongkorn University,* **2**(1): 5-19.

Guo P, Wang YZ. 2011. A new genus and species of cryptic Asian green pitviper (Serpentes: Viperidae: Crotalinae) from southwest China. *Zootaxa,* **2918**: 1-14.

Guo P, Zhang FJ. 2001. Comparative studies on hemipenes of four species of *Trimeresurus* (sensu stricto) (Serpentes: Crotalinae). *Amphibia-Reptilia,* **22**(1): 113-117.

Zhao EM. 2006. Snakes of China. Hefei: Anhui Science and Technology Publishing House, 445-466. (in Chinese)