

# A taxonomic Reinvestigation of the Collared Many-toothed Snake *Sibynophis collaris* Gray (Reptiles: Serpentes: Colubridae) from Jeju Island, Korea

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**Abstract:** In this study we reinvestigated the taxonomy of the collared many-toothed snake (Korean name: Bibari-bem) of Jeju Island, Korea. The Bibari-bem is a colubrid indigenous to Jeju Island and was first assigned to *S. collaris* Gray. However, the geographic distribution of *S. collaris* is not continuous with the Korean peninsula, making it doubtful that Bibari-bem should be assigned to it. Some herpetologists have suggested that Bibari-bem may instead belong to the closely related *S. chinensis* Günther. To resolve this conflict, we compared the diagnostic characteristics of *S. collaris* and *S. chinensis* as described in the literature with the characteristics of individuals collected on Jeju Island. We collected six individuals with one preocular, two postocular, two anterior temporal, and no lower ocular scales. Five individuals had nine (3-3-3 form) supralabials, among which fourth to sixth are touching the orbit and the ninth is the largest. One individual had eight (2-3-3 form) supralabials, third to fifth touching the orbit, with the eighth being the largest. These data suggest that Bibari-bem is not *S. collaris*, but *S. chinensis*.

**Keywords:** Biogeography, Colubridae, Jeju, morphology, *Sibynophis chinensis*, taxonomy

The collared many-toothed snake (Korean name: Bibari-bem) is a poorly studied snake of the genus *Sibynophis*, family Colubridae, found to be indigenous to Jeju Island, Korea in a study of its distribution and habitat by Kim and Oh (2005). The genus *Sibynophis* Fitzinger is found in Central America, southern Mexico, Madagascar, the Comoro Islands, Southern Asia, the Malay Archipelago, and the oriental region (Pope, 1935; Smith 1943). There are

seven *Sibynophis* species in Asia (Smith 1943). The Bibari-bem was first identified as *Sibynophis collaris* Gray, 1853 by Paik (1982).

Prior to the discovery of the species in Korea, *S. collaris* was only known to exist in southeastern Xizang (Tibet), Yunnan China, Assam and Simla of India, Burma, and Thailand, stretching as far east as Laos and Vietnam, and as far south as the Malay Peninsula (Zhao and Kraig, 1993). Its geographic range is quite distant from Korea. It is this geographic discontinuity that makes the assignment of the Bibari-bem to *S. collaris* suspicious.

On the other hand, Szyndlar (1987) assigned the Bibari-bem to *S. chinensis* Günther, 1889. *S. chinensis* is found in southern China, including Taiwan, Hong Kong and Hainan, and west to Yunnan and Sichuan and northern Vietnam (Zhao and Kraig, 1993). Geographically, its range is closer to Korea than that of *S. collaris*. Therefore, it seems more probable that the Bibari-bem of Jeju Island belongs to *S. chinensis*, rather than *S. collaris*.

*Sibynophis collaris* is similar in appearance to *S. chinensis*; however, the two can be easily distinguished by the number and shape of supralabial scales and the number of anterior temporal scales (Pope 1935, Smith 1943, Zhao 1987). Therefore, we compared differences in the number and shape of supralabial scales and the number of anterior temporal scales between *S. collaris* and *S. chinensis* with those of individuals collected on Jeju Island.

## MATERIALS AND METHODS

We collected six individuals of Bibari-bem during non-winter months between March 1998 and June 2005. We then compared the morphological characteristics of the collected Bibari-bem with the diagnostic morphological characteristics of *S. collaris* as identified by Paik (1982)

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**Table 1.** Measurements of the a *Sibynophis collaris* collected on Jeju Island, Korea

No.	Snout-vent length (mm)	Tail length (mm)	Total length (mm)	No. ventrals	No. subcaudals	No. ventrals and subcaudals	Remarks
1	317	81	398	189	107	296	juvenile
2	-	-	200	-	-	-	juvenile
3	445	29+	474+	188	13+	201+	adult
4	452	202	654	185	100	285	adult
5	406	104+	510+	188	57+	245+	adult
6	452	165	617	190	93	283	adult

and those of *S. chinensis* (Pope 1935, Smith 1943, Zhao 1987). However, we couldn't directly compare with the specimen of Paik (1982), because of the loss of it.

**RESULTS AND DISCUSSION**

The Bibari-bem has a black head with a black stripe running up the dorsal neck to the back of the head. There is a white stripe from the supralabials to the neck, the pupils are comparatively large and round in shape, and the scales are smooth. The coloring is similar to that of *Amphiesma vibakari* Boie, but its dorsal scales are brighter red, its ventral scales are a brilliant white, and both margins of its ventral scales are not spotted (Fig. 1).

The collected individuals have snout-vent lengths of 317-452 mm, tail lengths of 29+-202 mm, 185-190 ventral scales, 13+-107 subcaudal scales, and scales row of 17. They had one preocular, two postocular, and no lower ocular



**Fig. 1.** Photograph of a *Sibynophis collaris* from Jeju Island, Korea.

scales (Table 1). Five individuals have nine supralabial scales (3-3-3 form), with the fourth to sixth touching the orbit, and the ninth being the largest. They have two anterior temporal scales with the lower one contacting the seventh and eighth supralabials, and the upper one contacting the postoculars. One individual has eight supralabials (2-3-3 form), with the third to fifth touching the orbit, and the eighth being the largest. It also had two anterior temporals, with the lower one contacting the sixth and seventh supralabials (Table 2, Fig. 2).

*Sibynophis collaris* has 10 supralabials (3-3-4 form; rarely 9 or 11), where fourth to sixth touching the orbit, with the eighth is the largest. They have one anterior temporal scale, and the postoculars touch the eighth supralabial (Pope, 1935; Smith, 1943; Zhao, 1987; Zhao and Yang 1997; Table 3, Fig. 3). The individuals of Bibari-bem collected on Jeju Island do not share these characteristics.

*Sibynophis chinensis* commonly has nine supralabials (3-3-3 form), where the fourth to sixth touch the orbit. It rarely presents a variant with eight supralabials (2-3-3 form), where the third to fifth touch the orbit. It has two anterior temporals, where the lower one touches the seventh and eighth supralabials, and rarely touches the sixth and seventh supralabials. The upper anterior temporals touches the postoculars. These morphological differences allow herpetologists to distinguish *S. collaris* and *S. chinensis* based on the number and shape of the supralabial scales and the number of anterior temporal scales (Pope, 1935; Smith, 1943; Zhao, 1987; Table 3, Fig. 3). The characteristics of *S. chinensis* are nearly identical to those of the Bibari-bem collected on Jeju Island.

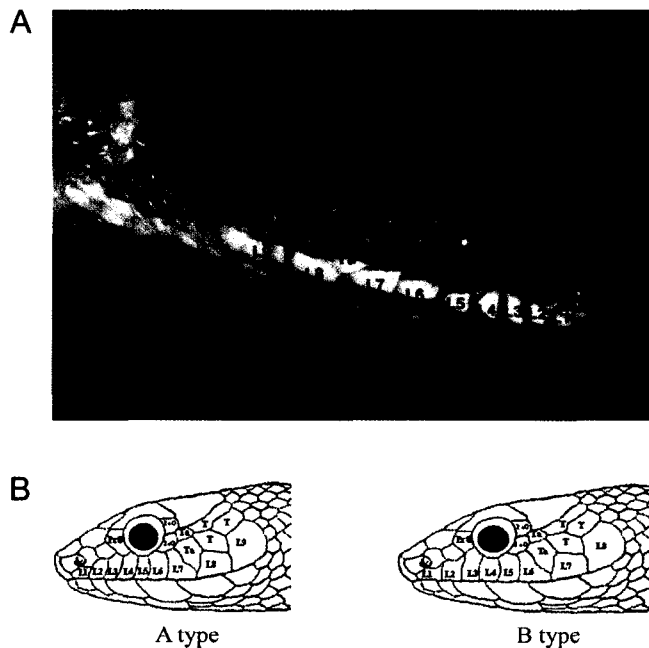
Paik (1982) identified the Bibari-bem of Jeju Island as *S. collaris*. We suspect that he made this classification

**Table 2.** Head scale characteristics of the six a *Sibynophis collaris* samples collected in Jeju Island, Korea

Type	No. individuals	No. of supralabials	No. of anterior temporals
A	5	9 (3-3-3 form); fourth to sixth touching the eye, ninth is largest	2; the lower touches the seventh and eighth supralabials, the upper touches the postoculars
B	1	8 (2-3-3 form); third to fifth touching the eye, eighth is largest	2; the lower touches the sixth and seventh supralabials, the upper touches the postoculars

**Table 3.** Comparison of scale characteristics of *Sibynophis collaris* with those of *S. chinensis*

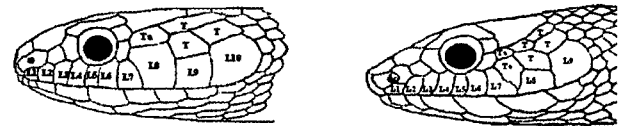
Species	No. of supralabials	No. of anterior temporals
<i>S. collaris</i>	10 (3-3-4 form); Fourth to sixth touching eye, eighth is largest	1; Touches the eighth supralabial
<i>S. chinensis</i>	9 (3-3-3 form), rarely 8 (2-3-3 form); Fourth to sixth or third to fifth touching eye	2; The lower touches the seventh and eighth; rarely the sixth and seventh supralabials



**Fig. 2.** Head scale characteristics of the Bibari-bem collected in Jeju Island, Korea. (a) Head photo of a Bibari-bem, lateral view. (b) Diagrams of two Bibari-bem variants seen in lateral view. A-type: nine supralabial scales; B-type: eight supralabial scales. PrO: preoculars, PoO: postoculars, Ta: anterior temporals, T: temporals, L1–L9: supralabials.

because he regarded *S. collaris* and *S. chinensis* as the same species. However, these two species can be clearly diagnosed by obvious morphological differences in the number and shape of the supralabial scales and the number of anterior temporal scales. Therefore, considering the morphological characteristics that distinguish *S. collaris* and *S. chinensis*, and the Bibari-bem has the characteristics of *S. chinensis*, and should be regarded as such.

This identification is congruent with the biogeographical data. The geographic distribution of *S. collaris* lies in Western oriental regions, whereas that of *S. chinensis* lies in Eastern oriental regions (Zhao and Kraig, 1993), so the global range of *S. chinensis* is geographically closer to the Korean Peninsula than that of *S. collaris*. In conclusion, the biogeography and morphological characteristics of the



**Fig. 3.** Head scale comparison of *S. collaris* (left) and *S. chinensis* (right), after Zhao (1987); L1–L10: supralabials, T: temporals, Ta: anterior temporals.

Bibari-bem of Jeju Island indicate that it is not *S. collaris*, but *S. chinensis*. Therefore, the scientific name of the Bibari-bem should be referred to *S. chinensis*. The question of why the Bibari-bem is restricted to Jeju Island and is not present on the Korean Peninsula remains to be addressed in the future research.

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[Received July 10, 2006; accepted September 6, 2006]