

A NEW SPECIES OF KRAIT, *Bungarus* (REPTILIA, ELAPIDAE, BUNGARINAE) AND THE FIRST RECORD OF THAT GENUS IN IRAN*

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We describe a new species of krait (Elapidae, *Bungarus*) from Baluchistan, Iran and that differs from all species of *Bungarus* except its closest relative *Bungarus sindanus* by having 17 dorsal midbody scale rows. The new species differs from the related allopatric *Bungarus sindanus* and *B. caeruleus* by a higher number of ventral plates and a different pattern and by an isolated occurrence in Baluchistan (Iran and Pakistan border region). The new species is especial by having a clear black spot in the loreal region and with an occasionally developed loreal plate (on both sides of head in the holotype).

Keywords: *Bungarus*; *Bungarus persicus*; new species; Iran.

INTRODUCTION

The Kraits of the Elapid genus *Bungarus* Daudin, 1803 are known to occur in south East Asia from Pakistan, India and Afghanistan in the west, and eastwards into tropical Southeast Asia. It occurs in the whole of the Indo-Chinese sub-region and adjacent areas to the Southeast Asia with around 12 to 14 species (Slowinski, 1994; Kharin et al., 2011). In the western part of the distribution the Sindhi krait, *Bungarus sindanus*, as well as the common krait, *B. caeruleus* (Schneider, 1801) are found in Pakistan, Afghanistan and India.

The taxonomic history of the genus *Bungarus* has been complicated as many of the species are infrequently collected and sparsely distributed (e.g., Kuch et al., 2005) and concerning the westernmost taxa occurring in Pakistan and India opinions have diverged over time. The

common krait, *B. caeruleus* was described already 1801 by Schneider while the second species occurring in sympatry, *B. sindanus*, was described by Boulenger 1897. But first after receiving additional specimens and then being convinced in that specimens with 17 scale rows Boulenger actually considered it to be a separate species. Mertens (1969) was of the opinion that 17 scale rowed *B. sindanus* was an individual variation and listed it as a synonym of *B. caeruleus*, while Klemmer (1963), Minton (1966) and Daniels (2002) mentioned it as a subspecies (race) of *B. caeruleus*.

Khan (1985) distinguished *B. sindanus* into two subspecies: *Bungarus sindanus sindanus* from western Thar Desert and *Bungarus sindanus razai* Khan, 1985 from northwestern Punjab in Pakistan. Das and Chaturvedi (1998) and Whitaker and Captain (2004) also include the Indian *Bungarus sindanus walli* Wall, 1907 as a subspecies, a taxon that earlier was considered as a full species (e.g., Klemmer, 1963).

In 2013 one of us (Elham Abtin) collected a specimen of *Bungarus* north of Sarbaz in Baluchistan, Iran, which is the westernmost record of that genus within its entire range and the first record of the genus *Bungarus* in Iran. In July 2014 after intensive searching a second female specimen was collected at another locality close to the first one. The locality of these specimens is situated about 50 – 100 km to the west of the Pakistan border. This present record is extraordinary as it extends the

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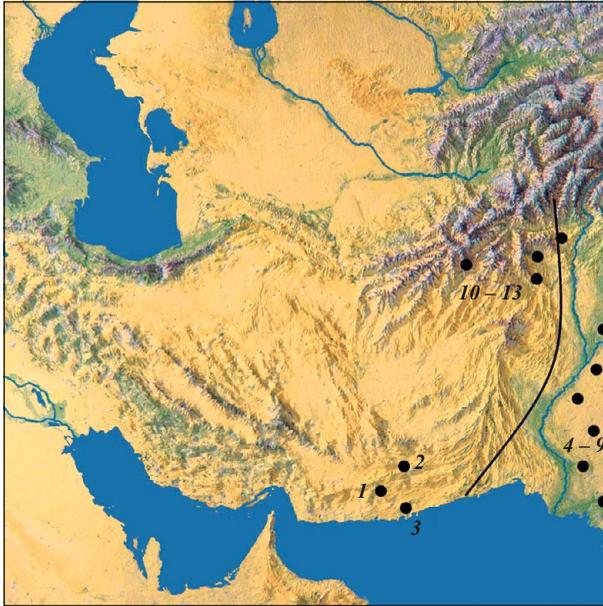


Fig. 1. The distribution of *Bungarus persicus* sp. nov. (Sarbaz, Iran) (1) and the Ras Jiunri specimen (Baluchistan – Pakistan) (2) (Shockley 1949) and the known distribution of the Sindhi Krait, *Bungarus sindanus sindanus* in Pakistan and India (3 – 8) and *Bungarus sindanus razai* in northwestern Punjab, Pakistan and Afghanistan (9 – 12). The subspecies *Bungarus sindanus walli* and are not on the map but it is distributed to the east and southeast in India. The western border for *Bungarus caeruleus* in Pakistan is indicated by the black line (after Khan, 2002).



Fig. 2. Holotype of the new Iranian krait, *Bungarus persicus* sp. nov. from Baluchistan, Iran. Photo by Elham Abtin.



Fig. 3. Species characteristic head pattern of the holotype of the Iranian *Bungarus persicus*. Observe the light preocular and black loreal spot. Photo by Elham Abtin.

range for this group of venomous snakes far westwards outside the know range for this elapid genus.

The holotype of this Iranian specimen of *Bungarus* is unique by the occurrence of a small loreal on each sides of the head which is extraordinary amongst elapid snakes. The paratype lacks loreals but both specimens have a characteristic black area in the loreal region and this in combination with morphological peculiarities, such as the shape and place of the prenasal plate as well as the high number of ventral and subcaudal plates makes us believe that it must be considered as a unique taxon, and we name it

Bungarus persicus sp. nov.

Holotype (Figs. 2, 3, 5 – 8). Golestan University, catalogue number ZMGU3121. Female from north of Sarbaz, Baluchistan, Iran (terra typica). Leg. Elham Abtin. Date September 29, 2013.

Paratype (Figs. 9 and 10). Golestan University, catalogue number ZMGU3256. Female from Bamposht of Saravan area, 20 km S of Sirkan, Geravani village (26°44'52.6" N 62°39'53" E), Baluchistan, Iran. Leg. Mousa Dehghan Nejhad. Date July 2014.

Additional material. Shockley (1949) mentioned a specimen with 235 ventrals from Jiwani (Ras Jiunri) in Pakistan. This locality is situated in southwestern Pakistan, about ten air-miles from the Iranian border. Shockley (1949) regarded it as a *B. caeruleus*. This specimen has not been available for us to examine, but the isolated location close to Iranian border and separation from the main ranges of *B. caeruleus* and *B. sindanus* in Pakistan indicate that this as well could be a specimen of *B. persicus*. The range of ventral plates is far outside the range of *B. caeruleus*, but within the range for *B. sindanus*, where the upper limit is reported as 237 ventrals (Boulenger,

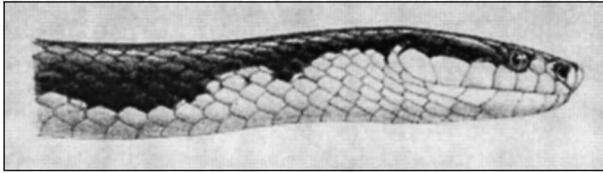


Fig. 4. The head pattern of the holotype of the Sindhi krait, *Bungarus sindanus*, from Boulenger 1897. Compare with Fig. 3.



Fig. 5. The head of the holotype of *Bungarus persicus* sp. nov. from Iran showing the loreal plate on the right side (arrow). Photo by Elham Abtin.

1896). *Bungarus caeruleus* has normally fewer than 217 ventrals (Khan, 1985). The high range of ventrals (194 – 234) reported for that taxon by Smith (1943) is when *B. sindanus* is included as a synonym in *Bungarus caeruleus*.

Minton (1966) was of the opinion that this Ras Jawani (Jiwani) record represents a well-isolated relict population. It is clearly geographically separated from the continuous ranges for *Bungarus caeruleus* and *B. sindanus* population in Pakistan, and in rather close connection with the Iranian Sarbaz locality. This could indicate that there is a more widespread occurrence in the Baluchistan dry lands at and around the border areas between Pakistan and Iran of this new taxon.

Definition and diagnosis. A species of *Bungarus* with 17 dorsal midbody scale rows and with the vertebral row enlarged. A high number of ventral (236 – 238) and subcaudal (50 – 53) plates. The prenasal is penetrating deep down in between the rostral and first supralabial and nearly reaching the edge of mouth and almost separating



Fig. 6. The head of the holotype of *Bungarus persicus* sp. nov. from Iran showing the loreal plate on the right side (arrow). Photo by Asghar Mobaraki.



Fig. 7. The head of the holotype of *Bungarus persicus* sp. nov. from Iran showing the loreal plate on the left side (arrow). Photo by Asghar Mobaraki.



Fig. 8. Technical photo of the holotype of *Bungarus persicus* sp. nov. (Golestan University, catalogue number ZMGU3121). Photo by Elham Abtin.



Fig. 9. Paratype of the new Iranian krait, *Bungarus persicus* sp. nov. from Baluchistan, Iran. Photo by M. Dehgannejhad.



Fig. 10. The head of the paratype of *Bungarus persicus* sp. nov. from Iran showing the left side of head. Observe the light preocular and black loreal spot. Photo by Elham Abtin.

rostral from the first supralabial on both sides. A small loreal plate on both sides makes the holotype specimen unique amongst elapid snakes, although a variable character as the paratype has no such loreal division. Preocular region and postnasal are white while the small loreal area is black in the holotype. The same area of the snout is also black in the paratype.

In the holotype the back is mostly black with 25 light triangle shaped pairs of crossbars plus two light triangular spots on each side of neck. The triangular pairs are all ending in pairs of rectangular whitish dots or short cross-

bars along the vertebral section (Fig. 8). The triangles are very pronounced. Three crossbars on tail. Head is black above and yellowish white below with a sharp border between the colors along the upper edge of the supralabials. In the paratype the back is mostly black with 26 light triangle shaped pairs of crossbars plus two light triangular spots on each side of neck. The belly is yellowish white in both specimens.

This new species is somewhat different from *B. sindanus*, which normally has a larger dorsal section black on anterior part of body and more straight transverse bands. Total length of holotype is 630 mm; tail length 80 mm. Total length of the paratype is 1190 mm.

Bungarus persicus sp. nov. differs from all congeners except *B. sindanus* by the combination of wide black and narrow white rings on body and tail and dorsal scales arranged in 17 rows.

Description of holotype. An adult female (Figs. 2 and 8), total length 630 mm, body-vent 550 mm, tail 80 mm and equal to 12.7% of total length. Length of head (from posterior corner of mouth to tip of snout) 14.39 mm, breadth of head at position of eyes 8.59 mm, breadth of head at posterior position 9.62 mm. Body scalation: ventrals 238. Anal plate undivided. Subcaudals 53. Tail normal. Dorsal scales smooth, in 17 rows at midbody; vertebral scales distinctly enlarged, largest and hexagonal at midbody. Head scalation: the rostral is broad and visible from above, bordering both internasals,

both prenasals and in a narrow lower zone first supralabials on each side. Nasals large and divided into postnasals and prenasals. The prenasal is penetrating deep down in between the rostral and first supralabial and nearly reaching the edge of mouth and almost separating rostral from the first supralabial on both sides.

The nasal plates are bordered by rostral, internasals, prefrontals, preoculars, loreals and first and second supralabials. Preocular hexagonal. A small loreal plate (Fig. 5) on both sides of head. Loreal small and with straight sutures towards postnasal and preocular, curved towards second and third supralabial and in small contact with the first supralabial.

Supraoculars longer than wide and in contact with preoculars, upper postoculars, frontal, prefrontals and parietals. Frontal longer than wide, bordered by prefrontals, supraoculars and parietals. Parietals long, anteriorly bordered by frontal, supraoculars, upper postoculars, anterior temporals and posterolateral margins bordered by posterior temporals and dorsal scales.

Seven supralabials on each side. The second supralabial is the narrowest. Third and fourth supralabial in contact with orbit. One preocular and two postoculars. Each preocular bordered by postnasal, loreal, third supralabial, supraocular and prefrontal. Postoculars bordered by orbit, fourth supralabial, fragment of fifth supralabial, anterior temporal, supraocular and in upper posterior corner of parietal. One anterior plus two posterior temporals on each side. The anterior temporal is bordered by fifth and sixth supralabials, upper and lower postoculars, parietal and posterior temporals. Posterior temporals bordered by parietals, anterior temporals, sixth and seventh supralabials and enlarged dorsal scales.

Mental triangular and bordered by the first sublabials. Seven sublabials on each side. Distinct mental groove. Third and fourth sublabials longer than broad and much enlarged, posterior in contact with the mental groove. First, second and third sublabials in broad contact with the first chinshields. Fourth sublabial in broad contact with the second chinshields. Two pairs of chinshields of the same size and shape as the third and

fourth sublabials on each corresponding side. Two gulars between first ventral plate and the posteriormost part of the chinshields.

The head and back is mostly black. Body with 27 triangle shaped pairs of crossbars ending in pairs of small rectangular whitish dots or short crossbars along the vertebral section. The triangles are very pronounced. Three crossbars on tail. The belly is yellowish white. Head is black above and yellowish white below with a sharp border between the colors along the upper edge of the supralabials. Preocular region and postnasal are yellowish white while the small loreal area is black. The eyes are large and black with an oval grayish pupil.

At midbody there are 17 dorsal scale rows and the scales in the vertebrate row are enlarged (broader than long) throughout the back. All the scales are smooth and anal and subcaudals are all entire.

The specimen (Figs. 2 and 3), which seems to be a young adult female (with high subcaudal count!), has 238 ventrals and 53 subcaudals. The number of ventrals is on the upper limit for *B. sindanus* (ventrals 220 – 237) as is the number of subcaudals (49 – 52 subcaudals in Pakistan *B. sindanus*) (Table 1).

Description of paratype. An adult female (Figs. 9 and 10), total length 1190 mm, body-vent 1030 mm, tail 160 mm and equal to 13.5% of total length. In scalation (Table 1) generally similar to the holotype but no loreals developed. Both specimens have a black spot in the loreal region.

Discussion. The occurrence of *Bungarus* in Iran is surprising and especially in the perspective that much investigations and collecting of snakes have taken place during long periods of time without documenting the occurrence of this taxon in Iran (e.g., Latifi, 1991, 2000, Rastegar-Pouyani et al., 2008). This can partly be explained by its occurrence in remote areas in Baluchistan and the nocturnal behavior of this species. Besides being severely dangerous inhabitants in the region generally avoids all close contact.

The morphological peculiarities, such as the shape and place of the prenasal plate as well as the dark spot in

TABLE 1. Morphological characteristics for the new *Bungarus persicus* compared with *Bungarus sindanus* and *B. caeruleus* specimens from their entire range (after Shockley, 1949, Khan, 2002 and Whitaker and Captain, 2004).

	Ventrals	Subcaudals	Midbody scale rows	Snout-vent, mm
Holotype <i>B. persicus</i>	238	53	17	550
Paratype <i>B. persicus</i>	236	50	17	1030
Ras Jiunri specimen Baluchistan Shockley, 1949	235	50	—	1595
<i>B. s. sindanus</i>	220 – 237	45 – 53	17	1034
<i>B. s. razai</i>	214 – 221	44 – 47	17	1125
<i>B. s. walli</i>	196 – 208	50 – 55	17 (19)	
<i>B. caeruleus</i>	205 – 217	33 – 54	15	1125

the loreal region are characteristic. The occurrence of a small loreal on both sides of head is extraordinary in the holotype. The high number of ventral plates as well as of subcaudals is higher than in other representative of the genus *Bungarus* or at least at or near the upper limit of ranges.

Of the six morphological and internal characters that are informative in *Bungarus* taxonomy, identified by Slowinski (1994), the new taxon fits in with the following: vertebral scales enlarged, subcaudals are all undivided and by having a pattern of white and black rings. Osteological characteristics has not been possible to examine. Neither the hemipenis characters as the two specimens are females. By these available character states it can be separated from *Bungarus lividus*, *B. bungaroides*, *B. flaviceps*, *B. fasciatus*, *B. magnimaculatus*, and *B. niger*. In addition it differs by the number of dorsal scale rows (17) from these and the following species: *Bungarus andamensis*, *B. caeruleus*, *B. candidus*, *B. ceylonicus*, and *B. multicinctus*. And the new species differs from all, including *B. sindanus*, by at least occasionally having loreal plates developed on each side of head.

Kahn (1985) pointed out differences between *Bungarus caeruleus* and *B. sindanus*. Factors such as number of midbody dorsal scale rows and number of ventrals, differ between the species. In these characteristics *Bungarus persicus* is similar to *B. sindanus*. *Bungarus sindanus* has always the second supralabial narrower than the third, which is also the case in our Iranian specimens. The Iranian *Bungarus* specimen is in addition most similar to *Bungarus sindanus* as it has 17 midbody scale rows, which most probably is a closely related taxon. It has similarities in the color pattern, which, however, is somewhat different. *Bungarus sindanus* has normally a larger part black on anterior part of body and more straight transverse bands. According to Smith (1943) the transverse bars are always distinct and widen on the sides of the body and with a vertebral spot always present in all specimens of *B. sindanus* examined by him. This agree also with the new species although the transverse bars are much wider on the lower section of the sides. The belly is uncolored.

From *Bungarus caeruleus* it differs, besides occasional presence of a loreal, by having 17 instead of



Fig. 11. The habitat of the Persian krait, *Bungarus persica* sp. nov. from north of Sarbaz in Baluchistan, Iran (terra typica). Photo by Elham Abtin.

15 midbody dorsal scale rows, a much higher number of ventrals and subcaudals (see Table 1) and a different pattern.

It is also geographically separated from *Bungarus caeruleus*, which occurs in eastern half of Pakistan and large regions of India and goes into Afghanistan, Sri Lanka, Nepal and Bangladesh. There is a large geographical distance from the record of *Bungarus* in Iran. *Bungarus persicus* is obviously separated by a large geographical distance also from the main range of *Bungarus sindanus* occurring in eastern Pakistan. The geographic ranges of the different subspecies of *Bungarus sindanus* in Pakistan and India are as follows: *Bungarus sindanus razai* is occurring in North Pakistan and with a record from Khowst in east Afghanistan (Kuch, 2004), while *Bungarus sindanus walli* is restricted to India. The southernmost nominate subspecies *B. s. sindanus* is distributed east of the Indus river in Pakistan as well as in western India (Fig. 1). Type locality for *Bungarus sindanus* is Singh in West Pakistan.

Compared to both these taxa it is characterized by having a large number of subcaudals (50 – 53). This number of subcaudals is a high count for a female. Normally males have longer tails due to copulatory organs in the tail and with higher numbers of subcaudals as

a consequence. A male of *Bungarus sindanus* from Afghanistan had 46 – 47 subcaudals (Kuch 2004). However, the specimen from Ras Jiunri, Baluchistan which eventually is a *B. persicus* is a male with 50 subcaudals (Shockley, 1949).



Fig. 12. The habitat of the Persian krait, *Bungarus persica* sp. nov. from north of Sarbaz in Baluchistan, Iran (terra typica). Photo by Asghar Mobaraki.



Fig. 13. The habitat of the Persian krait, *Bungarus persica* sp. nov. from north of Sarbaz in Baluchistan, Iran (terra typica). Photo by Asghar Mobaraki.

Habitat. The area where the specimen was collected is mainly flat plains as well as seasonal rivers bed with disperse vegetation compromising mainly with shrubs and some trees (Figs. 11 – 13). Elevations in the vicinity are usually present. The main plant species of the area are: Box Thorn *Lycium edgeworthii* (*LN: Zirok), Rhazya *Rhazya stricta* (LN: Eshvarak), Oleander *Nerium indicum* (LN: Djor), Pickleweed *Hammada salicornia* (LN: Terat), Mazari Palm *Nannorrhops ritchiana* (Daz), Indian Mesquite *Prosopis spicigera* (Kahoor), Tamarisk *Tamarix* sp. (Gaz), Saltwort *Salsola drummondii* (Alaf Shoor), Common Reed *Phragmites australis* (LN: Ney), Esfand *Peganum harmala* (Esfand). (*LN, Local Name).

There is not any specific destructive human activities in the area and grazing of the livestock seems to be the main activity. There is not enough information of the other species of reptiles or amphibians living in the area. Rodents and lizards seems to be the main fauna and could be the food sources for the snake. The habitat is situated in the arid zone experiencing very hot summers and a bit cold winters. The snake seems not to be abundant and it has been difficult to get access to additional specimens.

The snake and the local people. The snake is well known as a very dangerous venomous snake and all local people frightened it, and there is very strong and strange believes about it as a revenger. Local people are in belief that if you kill the female snake, later on the male one would take the revenge of killing his mate and as the bite of the snake is very painful and lethal the people avoid it seriously. The snake is well known in Baluchistan area with local name “Siah Mar” which means Black snake.

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