



Some Snakes of the Arid and Semiarid Regions of the Thar Desert in Rajasthan, India

Rakesh Kumawat¹ and Ashok Purohit²

¹Department of Zoology, Jai Narain Vyas University, Jodhpur, India, 342001 (rakeshophia@gmail.com [corresponding author])

²Department of Zoology, Jai Narain Vyas University, Jodhpur, India, 342001 (purohit1411@rediffmail.com)

Habitats in the arid terrain of the Thar Desert of Rajasthan range from agriculturally productive areas to true desert (K.K. Sharma and Mehra 2009). Although these conditions provide suitable conditions for many species of snakes, available information on distributions and habitat selection is sparse (R.C. Sharma 1996; Sinha and Sharma 2008; Solanki et al. 2015).

Herein, we provide locality records and data on the habitat of seven species of snakes encountered during time-constrained searches conducted by two or three persons at 19 sites in three districts (Fig. 1) every three months from September 2015 to August 2019. Sites in the Bikaner District were Bikaner, Kolayat, Shridungargarh, Poogal, Jorbeer-Gadwala Conservation Reserve,

Khajuwala, and Nokha; sites in Jaisalmer District were Pokhran, Jaisalmer, Lathi, Desert National Park, and Mohangarh; and in Jodhpur District, sites were Jodhpur, Balesar, Dechu, Lohawat, Osian Bilara, and Bap. We characterized habitats as stabilized dune, barren dune, grassland, agricultural fields, rocky terrain, Indira Gandhi Canal area, and urban land (Fig. 2). All snakes were examined, identified using the available literature and diagnostic keys (Smith 1943; Whitaker and Captain 2004; R.C. Sharma 2007), and released in suitable nearby habitat.

During the study period, we recorded 219 snakes of seven species (four families) with principal areas of occurrence in desert habitat. Relative abundance and habitat associations are illustrated in a matrix plot (Fig. 3).

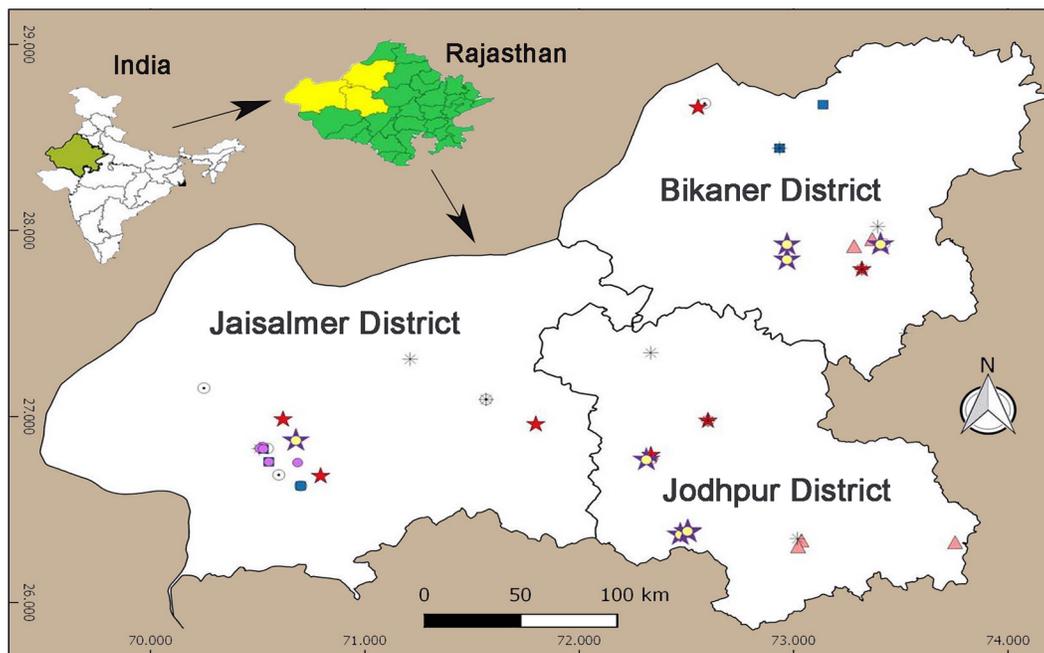


Fig. 1. Map of three districts of Rajasthan, India (Bikaner, Jaisalmer, and Jodhpur) marking observations of seven species of snakes in arid and semiarid regions of the Thar Desert: (☆) Sindh Awl-headed Snake (*Lytorhynchus paradoxus*), (*) Glossy-bellied Racer (*Platyceps ventromaculatus*), (★) Red-spotted Royal Snake (*Spalerosophis arenarius*), (▲) Black-headed Royal Snake (*Spalerosophis atriceps*), (○) Afro-Asian Sandsnake (*Psammodon schokari*), (●) Sindh Saw-scaled Viper (*Echis carinatus sochureki*), and (■) Sindh Krait (*Bungarus sindanus*). Created using QGIS desktop version 2.2.0 (Open Source Geospatial Foundation [OSGeo]).



Fig. 2. Habitats occupied by snakes in Thar Desert of Rajasthan: (A) Stabilized dune with sparse vegetation at Mohangarh, (B) grassland of Desert National Park, (C) rocky terrain at Nabhdungar of Desert National Park, (D) Indira Gandhi Canal area of Poogal, (E) barren dune of Khurdi, Desert National Park, and (F) grassland of Jorbeer-Gadwala Conservation Reserve, Bikaner. Photographs by Rakesh Kumawat.

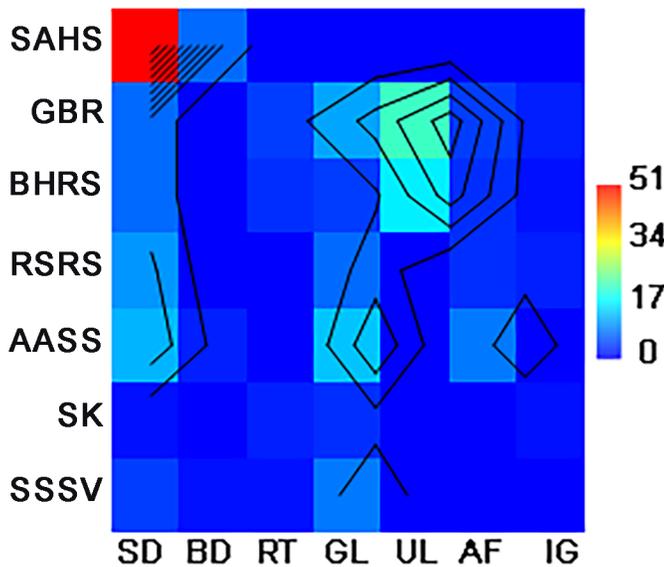


Fig. 3. Matrix plot showing the relative abundance and habitat associations of seven species of snakes in the study area. Abbreviations: Stabilized dune (SD), barren dune (BD), rocky terrain (RT), grassland (GL), urban land (UL), agricultural field (AF), Indira Gandhi Canal area (IG); Sindh Awl-headed Snake (*Lytorhynchus paradoxus*) (SAHS), Glossy-bellied Racer (*Platyceps ventromaculatus*) (GBR), Black-headed Royal Snake (*Spalerosophis atriceps*) (BHRS), Red-spotted Royal Snake (*Spalerosophis arenarius*) (RSRS), Afro-Asian Sandsnake (*Psammodromus schokari*) (AASS), Sindh Krait (*Bungarus sindanus*) (SK), and Sindh Saw-scaled Viper (*Echis carinatus sochureki*) (SSSV). Created using PAST version 4.03 (Natural History Museum, Oslo, Norway).

Sindh Awl-headed Snake, *Lytorhynchus paradoxus* (Günther 1875). Colubridae. (Fig. 4A). We recorded 58 individuals in the Jorbeer-Gadwala Conservation Reserve and Kolayat (Bikaner District); Desert National Park and Mohangarh (Jaisalmer District); and Balesar, Bap, Osian, and Dechu (Jodhpur District). Of those 58 snakes, 51 were in stabilized dunes and seven in barren dunes. We encountered both gray-white and light-brown morphs during this study. This species had been reported previously from Barmer

and Jorbeer in Bikaner District, a few localities in Jaisalmer District, and Ramgarh in Sikar District farther to the east (Bhide et al. 2004; Agarwal and Srikanthan 2013; Kachhawa et al. 2016; Kumawat and Purohit 2019).

Glossy-bellied Racer, *Platyceps ventromaculatus* (Gray 1834). Colubridae. (Fig. 4B). We recorded 49 individuals in the Jorbeer-Gadwala Conservation Reserve, Bikaner, Poogal, Khajuwala, Nokha, and Shridungargarh (Bikaner District); Mohangarh, Desert National Park, Pokhran, and Lathi (Jaisalmer District); and Jodhpur, Dechu, Bap, Lohawat, Balesar, and Bilada (Jodhpur District). Of those 49 individuals, 21 were in urban land, 11 in grassland, seven in stabilized dunes, four in agricultural fields, and two in the Indira Gandhi Canal area. The Glossy Bellied Racer has been reported from Ajmer in Rajasthan, Gujarat, Jammu and Kashmir, and the Delhi National Capital Region (Whitaker and Captain 2004; K.K. Sharma et al. 2010; Vyas et al. 2011; Narayanan and Satyanarayan 2012).

Red-spotted Royal Snake, *Spalerosophis arenarius* (Boulenger 1890). Colubridae. (Fig. 4C). We recorded 22 individuals at Jorbeer, Khajuwala, Deshnok, Bajju, and RD682 (Bikaner District); Desert National Park and Lathi (Jaisalmer District); and Dechu, Lohawat, Balesar, Bilada, and Pokharan (Jodhpur District). Of the 22 individuals, ten were in stabilized dunes, seven in grassland, three in agricultural fields, and two in the Indira Gandhi Canal area.

Black-headed Royal Snake, *Spalerosophis atriceps* (Fischer 1885). Colubridae. (Fig. 4D). We recorded 34 individuals in the Jorbeer-Gadwala Conservation Reserve, Shirdungargarh, Kolayat, Poogal, and Khajuwala (Bikaner District) and at Jodhpur, Bilada, and Balesar (Jodhpur District). This species was in all habitats except barren dunes; of the 34 individuals, 16 were in urban land, seven in stabilized dunes, four in grass-

land, three in agricultural fields, three in rocky terrain, and one in the Indira Gandhi Canal area. This species is distributed from areas of Himalaya to the west of the Indus River, the western boundary of Rajasthan, Gujarat (Kutch), Punjab, Kashmir, and Himachal Pradesh (Boulenger 1890; Smith 1943; Whittaker and Captain 2004; Sharma 2007; Saikia et al. 2007; Mukherjee 2015; Patel and Vyas 2019).

Afro-Asian Sandsnake, *Psammophis schokari* (Forskål 1775). Psammophiidae. (Fig. 4E). We recorded 35 individuals in the Jorbeer-Gadwala Conservation Reserve, Khajuwala, Kolayat, and Nokha (Bikaner District); Lathi, Desert National Park, Pokhran, and Mohangarh (Jaisalmer District); and Balesar, Osian, Lohawat, Baap, and Dechu (Jodhpur District). Of the 35 individuals, 13 were in grasslands, 12 from stabilized dunes, eight from agricultural fields, and two from barren dunes. All but one of the snakes was typically striped; the exception lacked stripes altogether. This species

had been reported previously from Jodhpur District (R.C. Sharma 2007; Whittaker and Captain 2004).

Sindh Saw-scaled Viper, *Echis carinatus sochureki* Stemmler 1969. Viperidae. (Fig. 4F). We recorded 14 individuals at Desert National Park (Jaisalmer District). Of the 14 individuals, eight were in grassland, four in stabilized dunes, one in barren dunes, and one in rocky terrain. This subspecies has been recorded in northwestern Rajasthan (Whittaker and Captain 2004; Afrasiab et al. 2011; Uetz et al. 2020).

Sindh Krait, *Bungarus sindanus* Boulenger 1897. Elapidae. (Fig. 4G). We recorded seven individuals at Chattargarh and Poogal (Bikaner District) and at Kanoi and Desert National Park (Jaisalmer District). Of the seven individuals, three were in grassland, two in rocky terrain, one in stabilized dune, and one in the Indira Gandhi Canal area. These snakes have been recorded from Maharashtra, Gujarat, and northwestern



Fig. 4. Snakes observed in the study area: (A) Sindh Awl-headed Snake (*Lytorhynchus paradoxus*), (B) Glossy-bellied Racer (*Platyceps ventromaculatus*), (C) Red-spotted Royal Snake (*Spalerosophis arenarius*), (D) Black-headed Royal Snake (*Spalerosophis atriceps*), (E) Afro-Asian Sandsnake (*Psammophis schokari*), (F) Sindh Saw-scaled Viper (*Echis carinatus sochureki*), and (G) a road-killed Sindh Krait (*Bungarus sindanus*). Photographs by Rakesh Kumawat.

Rajasthan (Whittaker and Captain 2004; Vyas 2007). This species is called the “Peevna” (= breathsucker) in the rural Thar Desert.

Of the nearly 350 species of snakes in India (Jangid et al. 2021), 34 are known to occur in Rajasthan (Bhatnagar et al. 2013), and 22 were listed by Kumawat and Purohit (2020) from the three districts of the Thar Desert. Moreover, our sightings document range extensions for *Lytorhynchus paradoxus* of 170–252 km to a new record in Jodhpur District (27.92611°N, 73.39848°E), for *Psammophis schokari* of 170–346 km to new records in Bikaner District (26.38553°N, 72.50555°E), and for *Spalerosophis arenarius* of 226–508 km to new records in Jaisalmer and Jodhpur (26.86142°N, 72.08388°E) Districts. Photographic vouchers of these species have been deposited in the Milwaukee Public Museum (VZP1003–5). The identity of these species was confirmed from photographs by Dr. Pratyush Mahopatra, Zoological Survey of India. These new records collectively indicate a need for further dedicated herpetological explorations in Rajasthan, with additional evaluations of the current status of populations and threats to the species and their habitats being of particular importance.

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