



Ecological Interplay: Observations on Snake-Bat Predation from Rajasthan

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Abstract

The predation of bats by snakes, though sporadically documented, highlights a fascinating predator-prey interaction that has remained understudied due to the nocturnal habits of bats and the inaccessibility of their roosts. Existing studies suggest that snake predation on bats, known as chiropterophagy, may be more widespread than previously assumed. This paper examines global accounts and presents novel observations of snake-bat interactions in India, where such instances are rarely reported. We document cases involving species like the spectacled cobra (*Naja naja*), Indian rat snake (*Ptyas mucosa*), and Forsten's cat snake (*Boiga forsteni*) in diverse habitats, including caves, temples, and historical structures. These findings shed light on the ecological contexts and adaptive behaviors associated with snake predation on bats, underscoring the need for further systematic research into this complex ecological relationship.

Keywords: Predator-prey interactions, Chiropterophagy, Bats and Snakes, Nocturnal predation, Snake-bat interactions

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Introduction

Predator-prey interactions are essential for maintaining ecological balance, yet certain dynamics remain poorly understood due to observational challenges (Belgrad & Griffen, 2016). One such interaction is the predation of bats by snakes. Bats are primarily nocturnal and often roost in secluded locations such as caves, abandoned buildings, and dense vegetation, making their interactions with predators difficult to study.

Studies on snake predation of bats have primarily focused on the Neotropics, where boiids such as boas and pythons are known predators. These snakes employ ambush tactics, often targeting bats within their roosting sites. Hammer & Arlettaz (1998) described snake predation facilitated by microhabitat features, emphasizing the role of cave crevices and ledges in shaping these interactions.

In a comprehensive analysis, Schatti (1984) examined global accounts of bats falling prey to snakes within the existing literature. The culmination of this review suggested that the consumption of bats, known as chiropterophagy, likely constitutes a prevalent occurrence among certain populations of various snake species.

Esbérard & Vrcibradic (2007) described four bat predation cases and reviewed Neotropical snake-bat interactions. They described that over 20 snake species, particularly boiids, prey on bats. Boiidae, mainly, and colubrids possibly, are primary bat predators. Martin-Solano et al., (2016) observed a rainbow boa (*Epicrates cenchria*) preying on vampire bats (*Desmodus rotundus*) within cave systems in Ecuador. Recently, Barti et al., (2019) documented bat predation by Aesculapian snakes and *Coluber hippocrepis* in caves, where structural features provided ambush sites. Despite these efforts, snake-bat interactions remain underexplored in many regions, including India.

India is home to a rich diversity of both bats (127 species) and snakes (approximately 302 species) (Talmale & Saikia, 2018; IndianSnakes.org). However, documented accounts of their ecological interactions are rare.

Although some rare encounters are documented, such as the observation in 2013 of a Red-tailed Trinket (*Gonyosoma oxycephalum*) snake in a Havelock Island cave, Andaman, preying on an Anderson's Leaf-nosed Bat (*Hipposideros pomona*) (Chakravarty, 2013).

These studies underscore the opportunistic feeding strategies of snakes and the ecological importance of understanding such interactions. However, snake predation on bats remains challenging to document due to its sporadic nature. Observations often require proximity to bat roosts, which are typically located in inaccessible or remote areas. Here, we have consolidated several observations of snake predation on bats in Rajasthan, India, offering insights into this unique ecological relationship

Observations in Rajasthan, India

Observation 1: Predation by the Spectacled Cobra (*N. naja*)

In 2018, near Ranthambore National Park (26° 2'40.80"N, 76°24'14.60"E), Rajasthan, a spectacled cobra was observed consuming a short-nosed fruit bat (*Cynopterus sphinx*). The incident occurred in an open area near a frangipani tree (*Plumeria rubra*), where the bat likely roosted. The cobra was photographed mid-consumption, providing rare evidence of chiropterophagy in a non-enclosed environment.

Observation 2: Attempted Predation by the Indian Rat Snake (*P. mucosa*)

In 2020, at an ancient temple in Bhilwara (25° 5'37.41"N, 75°10'22.00"E), Rajasthan, an Indian rat snake was observed attempting to prey on bats. The temple housed several bat species, including the black-bearded tomb bat (*Taphozous melanopogon*), naked-rumped tomb bat (*T. nudiventris*), and lesser mouse-tailed bat (*Rhinopoma hardwickii*). The snake, positioned near a crevice in the wall, attempted to capture a bat but retreated due to human presence. This observation highlights the adaptive hunting strategies of snakes in anthropogenic structures.

Observation 3: Presence of Forsten's Cat Snake (*B. forsteni*) in Bat Roosts

In 2023, two Forsten's cat snakes were observed resting approximately 15 feet above the ground on an overhanging limestone wall in a limestone cave at the Padajhar Waterfall (24°53'58.69"N, 75°31'42.01"E) in Bhensrodgarh Wildlife Sanctuary, Chittorgarh, Rajasthan. The cave also housed black-bearded tomb bats (*T. melanopogon*) and lesser mouse-tailed bats (*Rhinopoma hardwickii*). Interestingly, the wall where the snakes were perched was devoid of bats, possibly due to the snakes' presence or heightened light levels. Nearby, another temple repurposed from a

similar limestone cave, accommodated a significant *R. hardwickii* bat population adorning walls darkened by holly ritual residue. Notably, a snake resembling Forsten's cat snake, previously observed by author PK in 2020, eluded definitive identification. The natural ruggedness of the limestone walls furnished a selection of crevices, strategically advantageous for the snakes' predatory endeavors.

Observation 4: Strategic Perch Selection by Forsten's Cat Snake (*B. forsteni*) at Shahabad Fort

In August 2023, a Forsten's cat snake was observed at Shahabad Fort (25°14'1.59"N, 77°7'49.73"E), Baran, Rajasthan. The snake occupied a lintel above an ancient door frame, utilizing a concealed socket as a habitual perch. Moulting traces indicated the snake's regular presence in this location, suggesting it as a strategic hunting spot for intercepting flying bats.

It's noteworthy that door frames from that historical era were characterized by a distinctive feature—a socket seamlessly integrated into the header, intended to accommodate the door's pintle. Upon closer scrutiny, it became evident that this socket, also known as a gudgeon, served as a concealed location that revealed the snake's recurrent presence in this specific area. Significantly, traces of the snake's molt were conspicuously discernible within this recess, indicating a steady and habitual preference.

This observation prompts speculation concerning the snake's distinctive selection of a perch at the doorway and its potential role in intercepting flying bats. This aspect warrants further investigation within the context of the ongoing research.

A few days later, the authors revisited the same location during the early evening hours and made a noteworthy observation. The snake, which had previously been perched on the lintel of the doorway, had now ascended one of the inner walls and had taken up a position in a corner. Notably, a small group of bats was also present in the vicinity. Three distinct species of bats were identified: Indian roundleaf bat (*H. lankadiva*) (marking the second recorded occurrence of this species within the state), lesser mouse-tailed bat (*R. hardwickii*) and naked-rumped tomb bat (*T. nudiventris*).



a) Perch Selection by Forsten's Cat Snake



b) Strategic Perch Selection by Forsten's Cat Snake (B. forsteni) at Shahabad Fort

Discussion

The documented cases illustrate the opportunistic and adaptive strategies employed by snakes in targeting bats. These observations highlight the ecological interplay between snakes and bats, where factors such as roost structure, light levels, and predator presence influence bat behavior and roosting patterns. The observed avoidance of certain roosting areas by bats further underscores the evolutionary impact of snake predation on bat behavior and habitat selection.

India's biodiversity provides a unique setting to study such interactions. Snakes leverage natural and man-made structures for ambush hunting, while bats adapt their roosting preferences in response to predation threats. Understanding these dynamics is crucial for conservation, particularly as bats play vital roles in pollination and pest control.

Conclusion

This study highlights the opportunistic and adaptive predation strategies of snakes targeting bats, an understudied yet ecologically significant interaction. Observations from Rajasthan provide valuable insights into these dynamics, emphasizing the need for systematic research across diverse habitats. Future studies should explore how structural, environmental, and behavioral factors influence these interactions, leveraging technology to overcome observational challenges. Such efforts are critical for conserving bats, whose ecological roles are indispensable for ecosystem health.

Images:

Image 1: Forsten's cat snake stealthily ensconced within the crevices of a wall in a discrete corner, while a *T. nudiventris* bat finds repose on a beam in the opposing alcove. Image by: Dharmendra Khandal

Image 2: In a corner, the Forsten's cat snake patiently awaits the perfect moment, while across the room, a solitary Indian round-leaf bat clings to the ceiling. Image by Praveen Kumar

Image 3: A Spectacled cobra engulfs a bat with short-nosed fruit, its jaws stretched wide in the process. Image by: Dharmendra Khandal

Image 4: Map of observations



Image 1



Image 2



Image 3

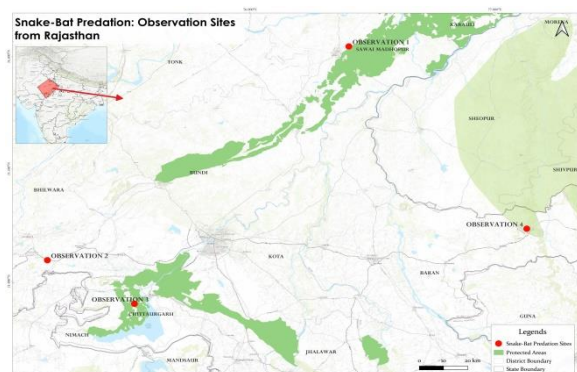


Image 4

Images 1, 2, 3 and 4: Bat and the Forsten's cat snake; Presence of Forsten's Cat Snake (Boiga forsteni) in Bat Roosts; Predation by the Spectacled Cobra (Naja naja); Map of observations

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