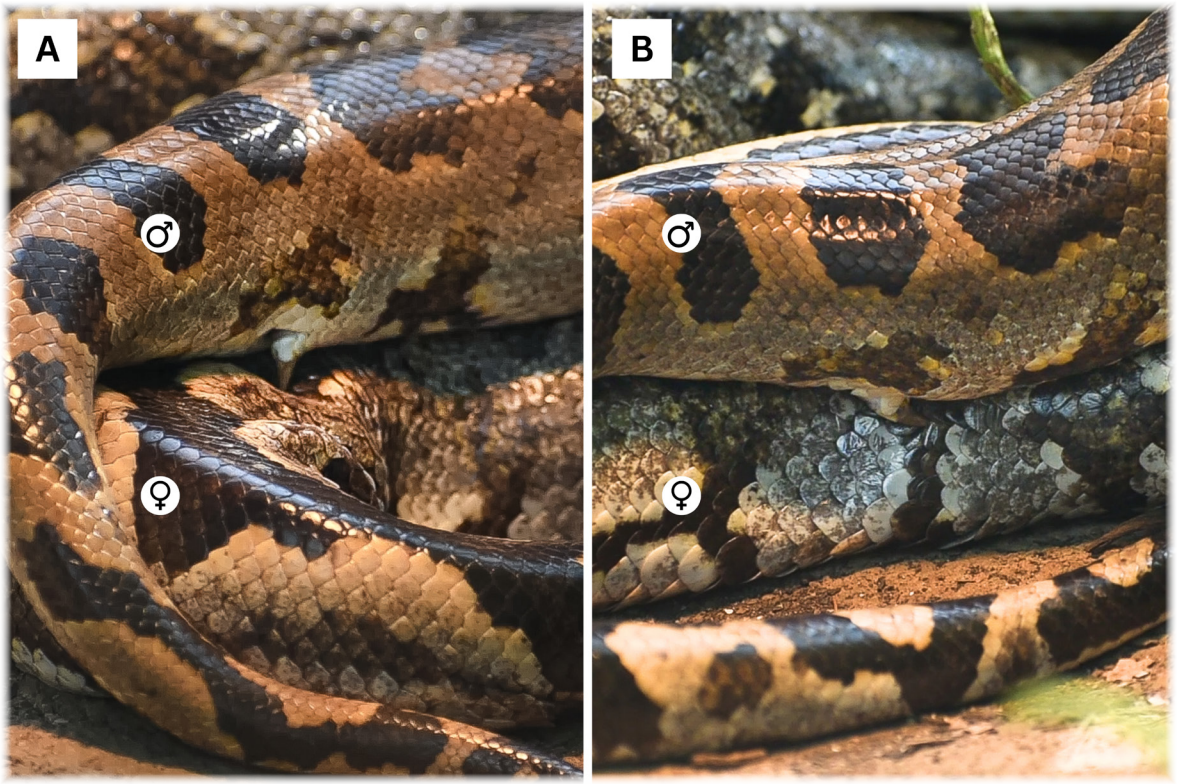
Insights into the use of pelvic spur in mating behavior of Indian Rock Python

Early species of snakes within the Alethinophidia clade exhibit pelvic spurs, a trait believed to be ancestral. These spurs are usually more pronounced in males and are equipped with muscles, nerves, and blood vessels, enabling them to move independently (Hoge 1947; Carpenter et al. 1978). They play pivotal roles in combat, courtship, and mating within the Boidae and Pythonidae families, underscoring their evolutionary significance (Stickel & Stickel 1946; Carpenter et al. 1978; Slip & Shine 1988). The use of pelvic spur for mating and combat is well recognized in Red-tailed Boa (Anzai et al. 2023), Burmese Python (Gillingham & Chambers 1982), and Diamond Python (Slip & Shine 1988). Our study highlights the significance and provide detail insights into the utilization of pelvic spurs in Indian Rock Python.

The Indian Rock Python *Python molurus*, distinguished by its robust build and distinct dark blotched pattern, is a large ovoviviparous snake prevalent across the Indian Subcontinent. However, detailed insights into the reproduction and captive management of this species are limited (Vyas 2002). Both sexes possess pelvic spurs located adjacent to the anal scale, with males typically showcasing larger spurs. These spurs, thought to be vestiges of hind limbs, are utilized actively in a range of behaviours, notably in mating, highlighting their evolutionary roots (Vyas 1996; Babar et al. 2019).

We observed pelvic spur usage during mating in Indian Rock Python at Sardar Patel Zoological Park, Ekta Nagar, Gujarat. The zoo houses a small group of four pythons (one male and three females) for exhibition purposes. The male python is 1.55 m (5.11 ft) long, while the female pythons measure 1.95 m (6.4 ft), 2.38 m (7.8 ft), and 2.47 m (8.10 ft), respectively. On 2 February 2024, we documented the male python engaging in mating behaviour, notably using its spurs to stimulate one of the females. In the observed behaviour, the male utilized its pelvic spurs in a manner that significantly influenced the positioning and receptivity of the female during mating. The interaction involved the male applying his spurs against the female's body, not with gentle rubbing but through



A—Male Indian Rock Python poking his spurs on dorsal part of the female's body to stimulate her. © Vaibhav Kansara.
B—Male Indian Rock Python using spur on the lateral side of the female's body for positioning her. © Vaibhav Kansara.

Table: Courtship behaviour observations of Indian Rock Pythons.

Observation no.	Date	Start time	Description of display
1	02.ii.24	1200 h	Male began to rub the sides of the females' bodies with his spurs.
2	02.ii.24	1400 h	Male began to climb onto female's backs and align his body with her. Afterward, the male began to rub its spurs on the sides of the female's body, going from posterior to anterior. At roughly about 1430 h, the female constrained her body and moved to the area of the enclosure with the densest vegetation after shifting positions in response to the spur's movement and touch.
3	08.ii.24	1030 h	The male stimulated the female by rubbing against her and using his spurs close to the cloaca.
4	08.ii.24	1100 h	Female appeared receptive, remaining still and allowing the male to approach and engage in courtship behaviours without aggression or resistance
5	08.ii.24	1130 h	The male slowly stopped rubbing his spur around the female's body, and they slowly moved apart.
6	10.ii.24	1530 h	The female displayed non-receptive behaviour by continuously vibrating her body and tail. This behaviour continued for around half an hour.
7	11.ii.24	0930 h	The male stimulated the female by rubbing against her and using his spurs close to the cloaca.

more forceful poking actions. This behaviour, reminiscent of finger-walking but executed with the spurs, serves to provoke a reaction from the female, likely due to discomfort or pain caused by the spurs' sharpness. The male's actions appear strategically designed to coax the female into repositioning her body into a posture more conducive to copulation (Shine 1994; Aubret et al. 2002).

Given the considerable size disparity often observed between female and male Indian Rock Pythons with females being substantially larger, it is plausible that this behaviour has evolved as a male strategy to navigate the challenges of mating with larger females. The variation in spur size between males and females, with males typically possessing larger spurs, further supports the idea of sexual dimorphism arising from reproductive strategies (Hoge 1947; Slip & Shine 1988).

Our observations during the breeding season emphasize the significance of pelvic spurs in reproductive behaviour and offer detailed insights into their utilization in Indian Rock Pythons. Additional research is required to fully understand the functional roles of pelvic spurs in snake courtship and mating behaviours.

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