# Photographic records of ophiophagy in Indian Fox (*Vulpes bengalensis*)

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Limited literature available on the dietary range of Indian Fox *Vulpes bengalensis*, through numerous studies so far reveal a wide-spectrum of food items (Johnsingh 1978; Johnsingh & Jhala 2004; Manakadan & Rahmani 2000; Gompper & Vanak 2006; Vanak & Gompper 2009; Home & Jhala 2009), including the venomous Saw-scaled Viper (*Echis carinatus*). This dietary is purely educed on the basis of scat or fecal analysis, without direct sightings or observations of Indian Fox predating such a venomous snake. In addition to the existing data, this note presents a prima facie observation of a fox consuming a Saw-scaled viper through photographic evidences. We were able to record *E. carinatus* in the food of Indian Fox, on two different occasions at Odu ni dhasi, Odu village and Bhajir Vandh, Naliya, Kutch (23°11'46"N; 68°50'47"E). Both these localities are on the edge of Little Rann of Kutch (LRK) and Kutch Bustard Sanctuary (KBS).

This entire habitat is known to be the best habitat for Indian Gazelle (*Gazelle gazelle*), Spiny-tailed Lizard (*Uromastyx hardwickii*) and Saw-scaled Viper, along with Indian Fox and many other forms of arid fauna. Rodgers *et al* (2000) classified the area under semi-desert region of India (Bio-geographic Zone 3B), characterized by scanty and erratic rainfall as well as extreme temperatures. Champion and Seth (1968) considered this area as Northern Tropical Thorn Forest (6B) and further sub classified it as Desert Thorn Forest (6B/C1). The entire geographical area has a large flat open saline landscape with grassland, low undulating terrain with small hillocks.

On 18th March 2012, while visiting the fringe area of LRK, at Odu ni dhasi saltpan area near Odu Village, Surendranagar, we came across an adult fox wandering around *Prosopis* shrubs with some prey hanging from its jaws, at a distance of about hundred meter. On careful observation using binoculars, we noticed the prey to be 15 cm long posterior half eaten body part of *E. carinatus* (Fig 1) hanging from the fox's jaws. Due to our presence, the fox advanced towards the *Prosopis* thickets with the food. It was clear that the anterior body part of the viper was already consumed. Within the next 20-25 minutes, even the remaining posterior part of the snake was devoured (Fig 2).

**Fig 1. Indian Fox (*Vulpes bengalensis*) with partly consumed Saw-scaled viper (*Echis carinatus*) at Odu Village, Gujarat, fringe area of Little Rann of Kutch. (Photo: Kartik Upadhyay)**

**Fig 2. Adult Indian Fox (*Vulpes bengalensis*) vigorously chewing Saw-scaled viper (*Echis carinatus*) within thickets of *Prosopis* vegetation. (Photo: Kartik Upadhyay)**

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**Fig 3. Fresh killed Saw-scaled viper (*Echis carinatus*) outside the fox's den along with a number of footprints (it could be *E. c. sochurei*). (Photo: Manoj Thaker)**

Our second observation was noted on 23rd March 2015, whereby an adult fox was seen carrying some food in the mouth and moving away from us, in the outskirts of KBS, near Naliya, Kutch. The fox immediately ran quickly towards the other side of the agricultural field. It crouched inside an underground burrow hurriedly, leaving the prey outside. Upon careful observation, we were able to examine and verify that the prey was an intact freshly killed 23 cm long *E. carinatus* (Fig 3). On our way back that evening, we did not find that killed viper outside the den. Instead we came across varying sizes of footprints, of adult foxes and pups. We thus assumed that the viper must have been eaten up by the pack after we left the area.

The *V. benghalensis* is a solitary and small canid widely distributed across Indian subcontinent from the foothills of the Himalayas in Nepal to the southern tip of the Indian subcontinent. Fox's feeding habits are mostly interesting, usually feeding on small animals and plants, depending upon availability of food within its habitat. They're highly opportunistic omnivorous canids being flexible for varied feeding habits (Jethva &Jhala 2003). Studies of dietary spectrum of foxes have revealed a wide range of prey species in diet, starting form rodents, lagomorphs, reptiles, birds, fishes, invertebrates and fruits. They have also been reported to feed on carcasses, eggs, and urban waste (Vanak & Gompper 2009). They are mostly crepuscular and nocturnal in habits, foraging usually during the dark hours. Their diet has been known to comprise of insects (grasshoppers, termites, beetles and ants), Arachnids (scorpions and spiders), crustaceans, rodents including gerbils, field rats and mice, hares (*Lepus nigricollis*), birds (*Perdicula, Francolinus* and *Pterocles*) and their eggs, and ground lizards and Calotes. Few species of snakes are also listed in the diet of *V. benghalensis*, including Common Rat Snake (*Ptyas mucosus*), Red Sand Boa (*Eryx johnii*) and Common Sand Boa (*Gongylophis conicus*) (Home & Jhala 2009). Fruits consumed by the foxes included ber (*Zizyphus* spp.), neem (*Azadirachta indica*), mango (*Mangifera indica*), jambun (*Syzygium cumini*), banyan (*Ficus bengalensis*) and pods of *Cicer arietum* and *Cassia fistula* (Johnsingh 1978; Manakadan and Rahmani 2000). They have also been reported to consume fruits of *Capparis*, *Acacia*, *Prosopis* and *Salvadora* (Home & Jhala 2009).

Both the observations have been noted in the month of March which coincides with the breeding season of foxes (Acharjyo & Misra 1976; Manakadan & Rahmani 2000; Gompper & Vanak 2006). This strengthens the possibility that may be the parent foxes predated and fetched a fresh killed *Echis* to feed it to the young pups as a rich source of proteins. Hunting and feeding of such a venomous and active viper snake by fox, describes the hunting acumen of

the species. The behavioral aspect of the adult fox bringing the viper near the mouth of the den also shows the strength of parenting instinct within the species, especially during the breeding season.

Saw-scaled Viper is one of the smaller venomous snakes from the Family Viperidae, growing hardly up to 40-50 cm and rarely 92 cm (Vyas 1987). This little snake holds enough venom to kill a small animal like fox. It is very widely distributed across the Indian subcontinent, recognized by two sub-species *E. c. carinatus* and *E. c. sochurei,* both of which occur in Gujarat (Whitaker & Captain 2004; Uetz & Hosek 2015). Feeding habit which involves ingestion of a venomous snake is termed as ophiophagy and is observed in only in few groups of smaller mammals (Voss & Jansa 2012), including several opossums (Didelphidae), hedgehogs (Erinaceidae), mongooses (Herpestidae), several mustelids and some skunks (Mephitidae). Venom resistance in ophiophagus mammals is a complex adaptation that merits attention from comparative biologists. How and why such hunting and feeding adaption was evolved in such groups of mammals is further a subject of ethno-evolution research. Unfortunately, evolutionary inference is currently limited due to our ignorance towards relevant facts, which can only be discovered by future research.

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