

# Study of Egg-Laying Behaviour of Fan-Throated Lizard, *Sitana Ponticeriana* (Cuvier, 1829) from Shrubland of Vadodara City, Gujarat, India

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## Abstract

*Sitana ponticeriana*, Fan-throated Lizard is an oviparous agamid lizard which lays eggs into the nest which is a hole dug by female in the actively searched suitable nesting site. A study has been carried out to understand the egg laying behaviour of the species in wild. In situ observations have been done regarding the nesting site characteristics and nest structure. This study also focuses on the ethogram of nesting and egg-laying behaviour. Total 13 distinct patterns has been recorded and grouped into two phases as nesting and ovulation.

**Keywords:** *Sitana ponticeriana*, nesting, hole-nest, ovulation, Scrubland.

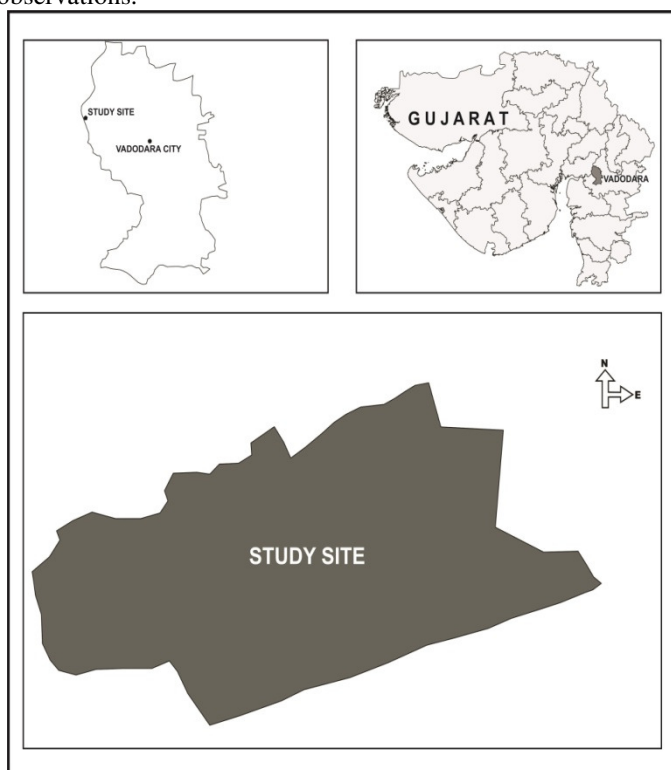
## Introduction

Nesting behaviour and egg laying behaviour are very important in the life of certain species because the nest site selection of the species can influence the survival of the infants<sup>1,2</sup>. The species which shows specific habitat and site selection for nesting, the study of nesting and egg laying behaviour is very important to design their conservation strategies<sup>3,4</sup>. *Sitana ponticeriana* is a wide spread medium sized lizard (SVL= 5-8 cm, adult) which occupies the dry areas and more or less open scrublands<sup>5</sup>. This is a ground dwelling lizard and its males can be recognized by gular flap<sup>6</sup>. In the breeding season this gular flap serves as a tool for display and mate choice. The dewlap extension is the mode by which the males are sexually selected for mating<sup>7</sup>. This lizard is oviparous, polyautochronic, multi-clutched and breed from May to August. Egg-laying commence in July and individuals may lay up to October. The eggs are laid in a hole dug by female and clutch size has been observed to be 9-16<sup>8,9</sup>. However, the details of egg laying behaviour in this species are not investigated well. So the present study focuses on the Ethogram of nesting and egg-laying behaviour of *S. ponticeriana*.

## Material and Methods

The present study was conducted in scrubland (22°20' 46 N, 73°03' 52 E) covering an area of 2 sq. Km located at Amarapura village near Umeta Bridge on the outskirts of Vadodara city (figure 1). The selected study area was about 20 km. West to Vadodara city and forms a part of Great Mahi ravines. River Mahi is one of the major rivers of the central Gujarat flowing through this area and is situated just 600 m south to the present study area. The method adopted in the present study was direct sighting or visual encounter method. The area was thoroughly searched for the presence of the species, as species being much cryptic and tries to conceal itself

with the environment, the combing operations were carried out by disturbing the scrubs and bushes so that the movement of the individuals could enable in sighting them and record further observations.



**Figure-1**  
**Map of Study area**

The study was initiated during May 2008 and was carried out till August 2009. Surveys were done on regular basis (once in a week) during both morning and evening hours. The morning surveys were done from 0700 hrs to 1100 hrs and the evening

surveys were done from 1600 hrs to 1830 hrs. Observations were recorded and properly videotaped to get all minute details of behavioural displays using digital camera (OLYMPUS FE-330). All the measurements were taken by standard measuring tape. Eggs were collected from field and its morphometry was done with the help of digital Vernier callipers. The nest temperature was recorded using soil thermometer.

## Results and Discussion

The Ethogram (figure-2) was developed by studying video analysis as well as direct observations in field. The different terminologies were discussed and some of them are adopted after Torr and Shine<sup>10</sup>.

There are several new terminologies which are not discussed in Torr and Shine<sup>10</sup> classification. They are as follows

**Wondering:** Solitary roaming by gravid female in search of nesting site.

**Surveying:** Soil is checked and surveyed by female for its softness and humidity.

**Digging:** Soil is dug by forelimbs alternatively using left and right arms.

**Site Selection:** a place is selected which has good concealment and soft and humid soil. (figure-3)

**Alert:** Head and body are raised from the surface of the land with open eyes. (figure-4)

**Gape:** Wide opening of jaws while digging the hole. (figure-5)  
**Straddling:** Eggs are laid by orienting its hind limbs over the hole in such a way that the cloaca is projected into hole. (figure-6)

**Arranging:** Eggs are arranged into hole by periodic movements of snout inside the hole. (figure 7a, b)

**Soil Collection:** Dug soil is collected back to hide the eggs. (figure-8)

**Hiding:** The eggs are hidden by spreading soil on them. (figure-9)

**Rotating:** A circular swift movements around the nest.

**Tamping:** Soil is pressed down over the eggs using forehead and proximal part of body after laying eggs. (figure 10)

**Flee:** Female flee away from nest after

Hiding eggs into the hole-nest.

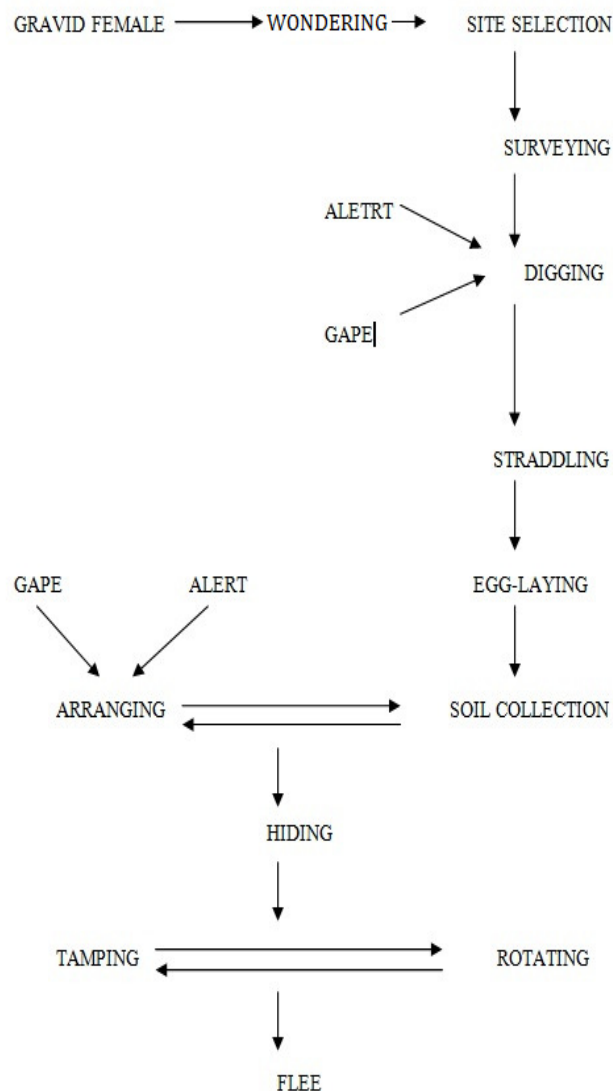


Figure-2  
Ethogram of egg laying behaviour of *Sitana ponticeraiana*

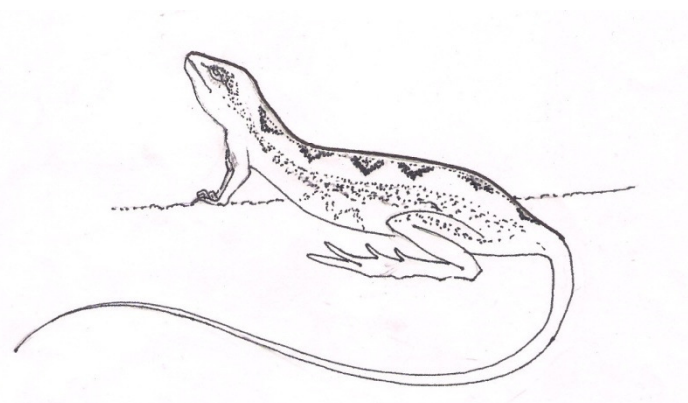
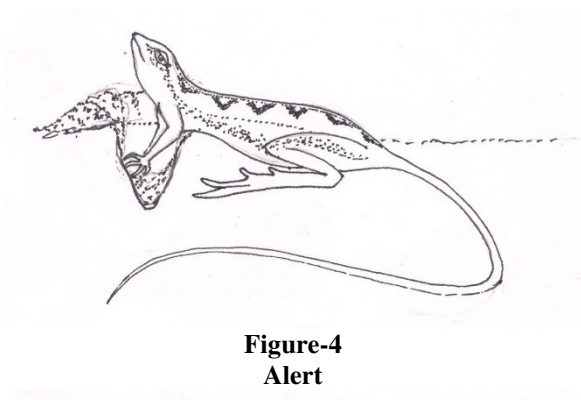
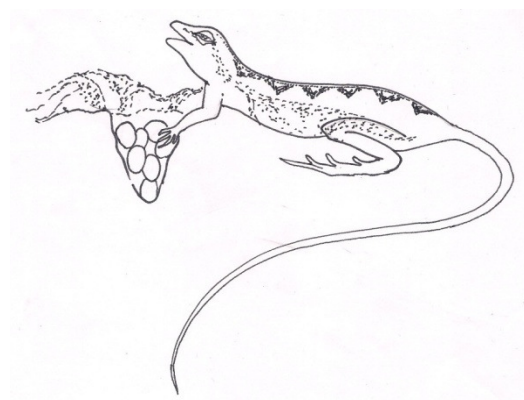


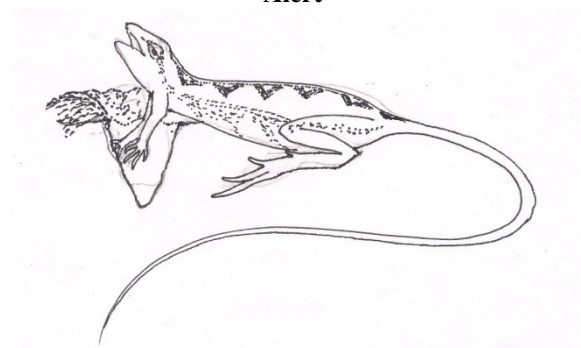
Figure-3  
Nest site selection



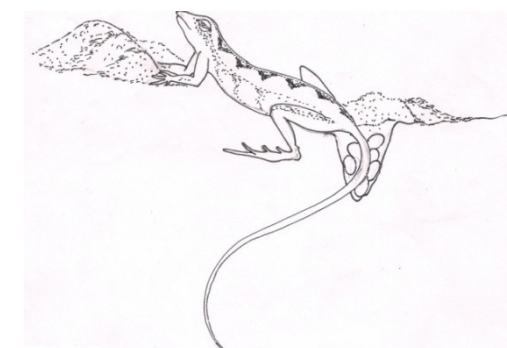
**Figure-4**  
**Alert**



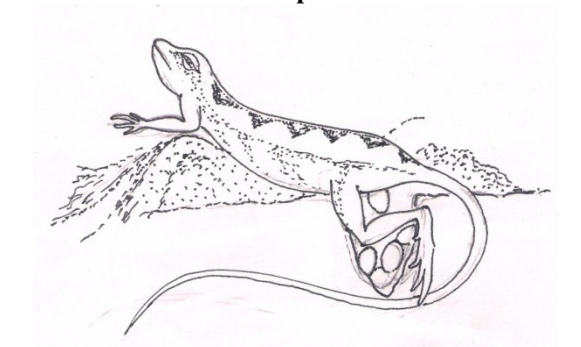
**Figure-7b**  
**Arranging**



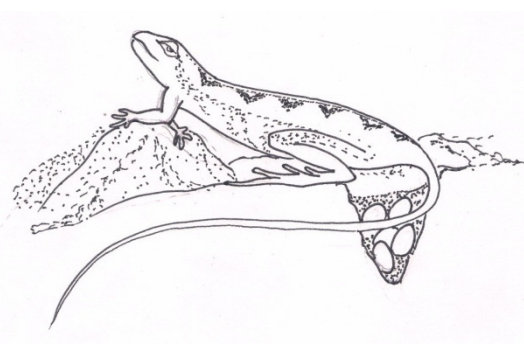
**Figure-5**  
**Gape**



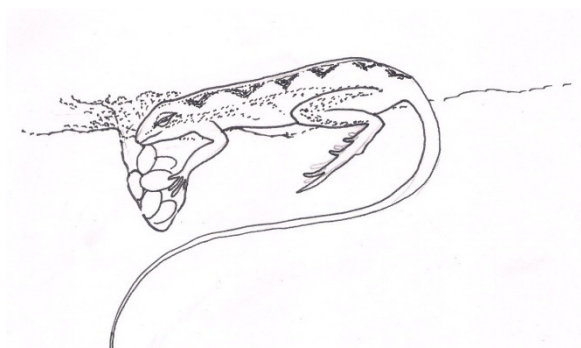
**Figure-8**  
**Soil Collection**



**Figure-6**  
**Straddling**



**Figure-9**  
**Hiding**



**Figure-7a**  
**Arranging**



**Figure-10**  
**Tempting**

All the behavioural patterns mentioned, have been grouped into two distinct phases i.e. Nesting and Ovulation.

**Nesting** During the Breeding season of *Sitana ponticeriana*, it has been observed that copulation happens in May to June and nesting season has been observed from June to October. A gravid female starts searching i.e. it roams alone in search of nesting site. The nesting site has been selected by female on basis of good concealment and soft and moist soil. It has been observed that the nesting site is surveyed by female in which the softness of the soil, concealment, temperature and humidity is checked. The temperature has been recorded to be  $35.62 \pm 0.9^\circ\text{C}$  (N=7) under the bushes and relative humidity was found to be  $73.62 \pm 3.69\%$  (N=7). However, the concealment site is more surveyed for the hiding places. The common plants associated with concealment and nesting place have been observed to be *Zizipus* spp. and *Prosopis juliflora*. The nest holes are also made under the shrubs like *Capparis decidua* and *Calatropis procera*. A  $6.07 \pm 0.39\text{cm}$  deep and  $1.25 \pm 0.1\text{cm}$  wide nest hole is dug using forelimbs in  $40.67 \pm 2.56$  minutes (N=3). Hole is dug alternatively by right and left forelimbs and the soil dug is kept near the hole. Alert and Gape behaviour has been recorded during digging which may be a sign of defensive display. One very unusual behaviour has been recorded that the species makes pseudo-nests near the active nest sites to decrease the risk of predators. The number of pseudo-nests has been observed to be 2 per one active nest however; it may vary depending on predator population. The pseudo-nests can be easily recognised by their measurements i.e.  $2.1 \pm 0.14\text{ cm}$  (N=2) deep and  $1.1 \pm 0.14\text{ cm}$  (N=2) in diameter.

**Ovulation** After making the nest-hole female gets ready for egg-laying. starting with straddling and the eggs are laid. female continuing with straddling position starts soil collection. The soil used for collection and to burry eggs is from her dug nest-hole. The eggs inside the hole are arranged periodically and simultaneously during soil collection using snout. This is followed by hiding the eggs and again arranging them in nest-hole. Gape and alert are also observed during this process. After hiding the eggs they are tamped by forehead and proximal part of body. This is accompanied by rotating movements and alert. After tamping the female flee away. The eggs were collected from the field. They are chalky white in colour and are  $7.78 \pm 0.31\text{mm}$  (N=9) in length and  $4.35 \pm 0.63\text{mm}$  (N=9) in width. The egg weight was calculated to be  $0.0683 \pm 0.0072\text{gm}$  (N=9). The average egg volume was calculated to be  $76.35\text{ mm}^3$ .

## Conclusion

*Sitana ponticeriana* as mentioned earlier is one of the most common agamid lizard found in the shrubland. Though being widespread still it is least studied for behaviour and ecology The egg laying or ovipositional behaviour performed by the species slightly varies from the ovipositional behaviour performed by other agamid species like *C. versicolor* and *C. ceylonensis*<sup>11,12</sup>.

The present study provides the crucial information about the egg laying behaviour of *Sitana ponticeriana* which can be utilized to make better conservation policy for conservation of the species.

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