# ZOO'S PRINT

## Communicating Science for Conservation

Vol. XXXIII, No. 7, July 2018
ISSN 0971-6378 (Print); 0973-2543 (Online)

Magazine of Zoo Outreach Organization
www.zoosprint.org

ZOO'S PRINT

Communicating science for conservation

Vol. XXXIII, No. 7, July 2018 ISSN 0971-6378 (Print); 0973-2543 (Online)

## Contents



Cover design by Latha G Ravikumar and G. Arul Jegadish, Zoo Outreach Organization, Coimbatore

# FRUIT BATS OF SOUTH ASIA

## PART 2

## Egyptian Fruit Bat *Rousettus aegyptiacus* (E. Geoffroy, 1810)

**Distinguishing characters:** This species is distinctly larger than the largest *Cynopterus* species. and more robust than *R. leschenaulti*. There is a size variation between sexes, with males being bigger. The dorsal pelage is fine and silky, and a lighter shade of brown. The ventral pelage is light grey. The muzzle is longer and sturdier than the more common Indian *R. leschenaulti*. The eyes are bigger than *Cynopterus* spp.

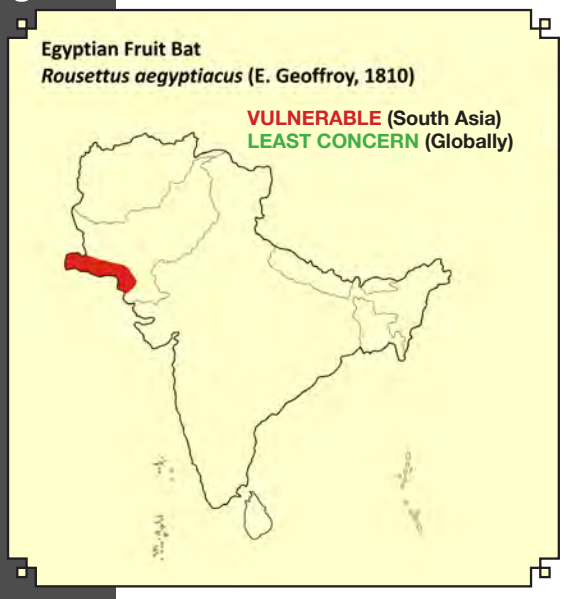
**Body measurements:** The head-body length is about 122mm, forearm length about 88mm.

**Habit and habitat:** It occupies caves, unused structures such as tunnels, old buildings and culverts in moist habitats. These bats prefer roosting in darker areas in small colonies of up to 50 individuals. It also seems to change roost sites depending on seasons and behaviours. As in *R. leschenaulti*, this species has a well developed sense of smell and is known to travel long distances in search of over-ripe fruits.

**Distribution:** Its main distribution ranges in the eastern parts of Africa and the Middle East ending in Pakistan. It does not occur in other parts of South Asia, not east of river Indus. The subspecies, *R.a. arabicus* occuring in Pakistan, is smaller than the African subspecies *R.a. aegyptiacus*.

Arnab Roy / Bat Conservation International

**Status:** It is widely distributed, but in Pakistan its status is threatened from loss of habitat and loss of quality of habitat due to human interference, hence it is Vulnerable in South Asia.



# Fantastic Facts

## Fulvous Fruit Bat *Rousettus leschenaulti* (Desmarest, 1820)

**Distinguishing characters:** This is a larger bat compared to *Cynopterus sphinx,* but is slightly smaller than *R. aegyptiacus.* The dorsal pelage is smooth and silky, and dark or fulvous brown. The ventral pelage is paler. The muzzle is longer and more slender than that of *Cynopterus* spp. The eyes are distinctly bigger.

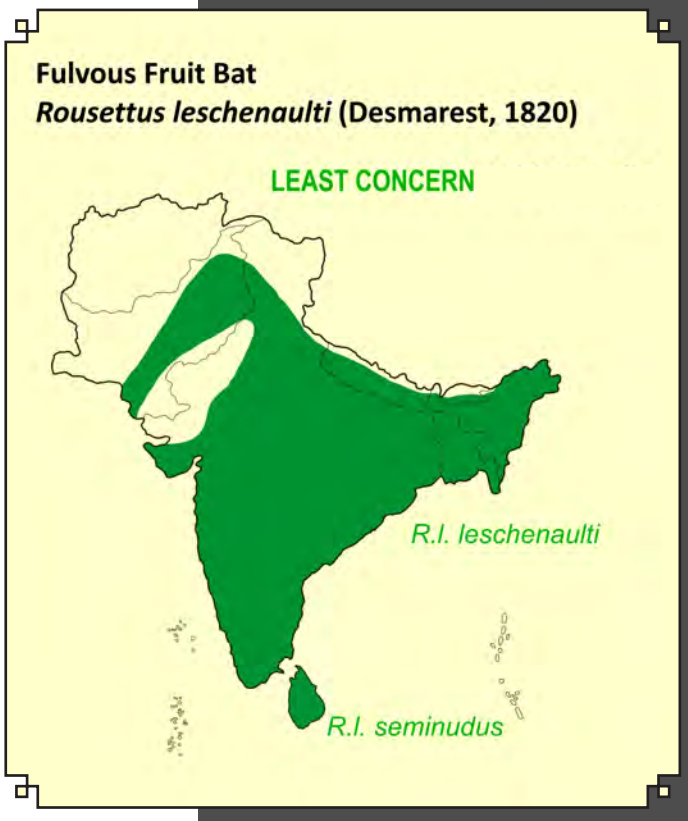
**Body measurements:** The head-body length is about 125mm, forearm length about 80mm, weight about 35g.

**Habit and habitat:** This is a species that occupies caves, culverts and old buildings in remote places. It does not live close to human habitations. It is seen in colonies ranging from a few individuals to many hundreds. In rare cases individuals can be seen roosting in the twilight zones of caves and under palm fronds. It is predominantly a fruit eater although it has been known to feed on molluscs and fish occasionally.

Arnab Roy / Sanjay Molur ZOO/WILD

**Distribution:** It is widely distributed throughout South Asia, Myanmar and is also known from Tibet. It occupies a range of habitats from arid to high elevations. The nominate subspecies *R.l. leschenaulti* occurs on the mainland, while the other subspecies *R.l. seminudus* is restricted to Sri Lanka.

**Status:** Its wide distribution with few known or recorded threats make this species Least Concern in South Asia. This is true of both the subspecies.



# Fantastic Facts

## Island Flying Fox *Pteropus hypomelanus* Temminck, 1853

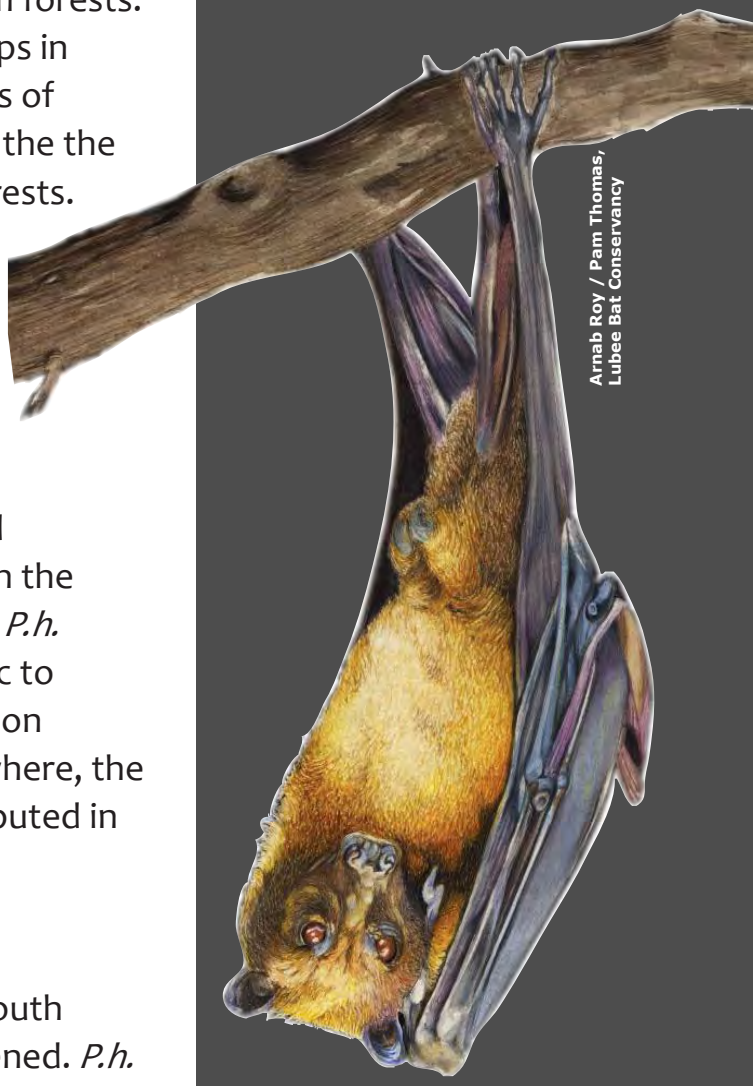
**Distinguishing characters:** This is a medium-sized fruit bat. The dorsal pelage is variable with fawn on head, deep brown mantle, grizzled back and dark brown face. The ventral surface is fawn-coloured. The ears are broad, short and with broad, rounded tips. Claws are less well-developed and feet small compared to *P. giganteus*.

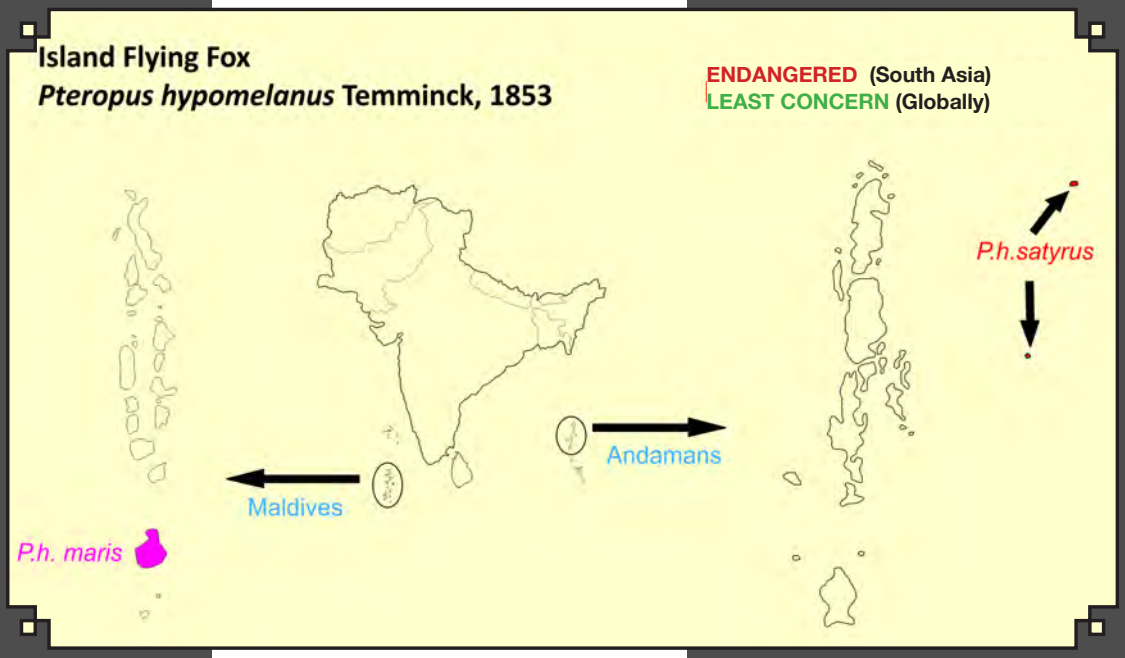
**Body measurements:** The head-body length is about 210mm, forearm length about 140mm and weight about 600g.

**Habit and habitat:** This is a gregarious species roosting in large numbers in coconut groves and orchards in disturbed areas away from forests. This species helps in dispersing seeds of fruiting trees in the the periphery of forests.

**Distribution:** Two subspecies -- *P.h. satyrus* is endemic to Narcondam and Barren Islands in the Andamans, and *P.h. maris* is endemic to Heratara Island on Maldives. Elsewhere, the species is distributed in Southeast Asia.

**Status:** The two subspecies in South Asia are threatened. *P.h. maris* in the Maldives is



# Fantastic Facts

Critically Endangered as it is known only from a single location where the species is believed to be persecuted. As a relatively recent survey did not record this taxon on Maldives, it is even suspected to be Extinct.

Although no direct threats have been observed to affect the other endemic subspecies *P.h. satyrus* on Andaman Islands, the taxon is Vulnerable due to restricted distribution and the likelihood of any adverse event affecting the populations, such as tsunami.

The status of the species in South Asia is Endangered.

**Sources:**


**Bates, P.J.J. & D.L. Harrison (1997).** *Bats Of The Indian Subcontinent*. Harrison Zoological Museum, Sevenoaks, Kent, UK, 258 pp.

**Bonaccorso, F.J. (1998).** *Bats of Papua New Guinea*. Conservation International Tropical Field Guide Series, Conservation International, Washington, D.C., 489 pp. (Island Flying Fox *Pteropus hypomelanus* Temminck, 1853)

**Molur, S., G. Marimuthu, C. Srinivasulu, S. Mistry, A.M. Hutson, P.J.J. Bates, S. Walker, K.P. Priya & A.R.B. Priya (Editors) (2002).** *Status of South Asian Chiroptera: Conservation Assessment and Management Plan (C.A.M.P.) Workshop Report*. Zoo Outreach Organisation, CBSG South Asia and WILD, Coimbatore, India, viii+320pp.+CD-Rom.

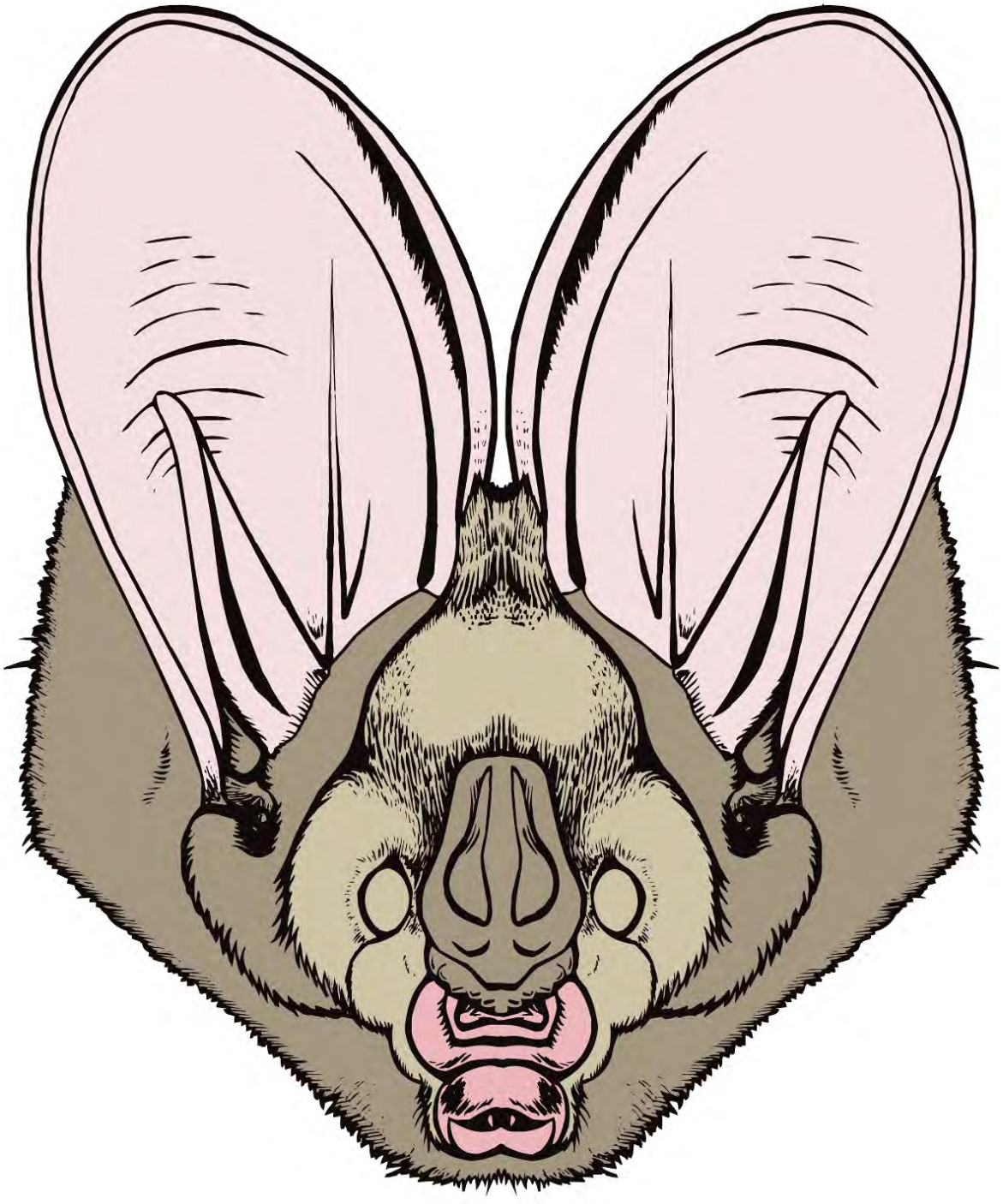
**Francis, C., G. Rosell-Ambal, F. Bonaccorso & A., Heaney, L., S. Molur & C. Srinivasulu (2008).** *Pteropus hypomelanus*. The IUCN Red List of Threatened Species 2008: e.T18729A8511932. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T18729A8511932.en. Downloaded on 09 July 2018.

**Korine, C. (2016).** *Rousettus aegyptiacus*. The IUCN Red List of Threatened Species 2016: e.T29730A22043105. http://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T29730A22043105.en. Downloaded on 09 July 2018.

**Bates, P. & K. Helgen (2008).** *Rousettus leschenaultii*. The IUCN Red List of Threatened Species 2008: e.T19756A9011055. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19756A9011055.en. Downloaded on 09 July 2018.


**by Sally Walker and Sanjay Molur**

# Print this mask on a card and cut it



***Megaderma spasma***

Collect these masks for exciting games

# LESCHENAULT'S SNAKE-EYE LIZARD

## Ecology of *Ophisops leschenaultii* in Pakkam Hills, Gingee, Eastern Ghats, Southern India

Ecological studies are lacking for many Indian lizards (Venugopal 2010), particularly the presumed, widespread, non-endemic species. One such poorly studied lizard is the Leschenault's Snake-eye Lizard *Ophisops leschenaultii*. This species is found in southeastern India and in Sri Lanka (Das 2002; Das & DeSilva 2005; Venugopal 2010; Ganesh & Chandramouli 2017). Recent studies have provided some information on the current distribution of *Ophisops leschenaultii*, and some studies have also dealt with phylogeny and ontogenetic colouration (Agarwal et al. 2017; Ganesh & Chandramouli 2017; Kumar et al. 2017). In the present short note, we enumerate our field observations on the ecology of *Ophisops leschenaultii* with special reference to the local conditions and environmental parameters.

IUCN Red List:
Not Evaluated

We used Diurnal Time-Constrained Search Method (DTCS, after Ribiero-Junior et al. 2008) in Gingee hills (12.23333$^0$N & 79.38333$^0$E), which was divided into five sub clusters (Siruvadi hills, Muttakaadu hills, Paadipallam hills, Karai hills, and Pakkam hills), from December 2015 to February 2016 besides 80 hours sampling with two man efforts. The Pakkam hills are unique (in terms of less disturbance) among these clusters and consist of sparse vegetation with a rocky terrain (Kalaimani 2011). During our herpetofaunal surveys, we obtained several sightings of *Ophisops leschenaultii* in the Pakkam hills, whereas the hills Siruvaadi, Muttakadu and Karai did not yield a single sighting with an exception of Paadipallam. During this study we evaluated the following variables: number of individuals, temperature, humidity, elevation, microhabitats and species activity.

**Reptilia**
[Class of Reptiles]

**Squamata**
[Order of Scaled reptiles]

**Lacertidae**
[Family of true lizards]

***Ophisops leschenaultii***
[Leschenault's Snake-eye Lizard]

Species described by Milne-Edwards in 1829

In total, we obtained 69 sightings in the Pakkam hills. The minimum and maximum average temperatures were 28$^0$C and 35$^0$C, respectively, and the minimum and maximum average humidity were 40% and 70%, respectively (Table 1). We compared

Table 1: Field Observations

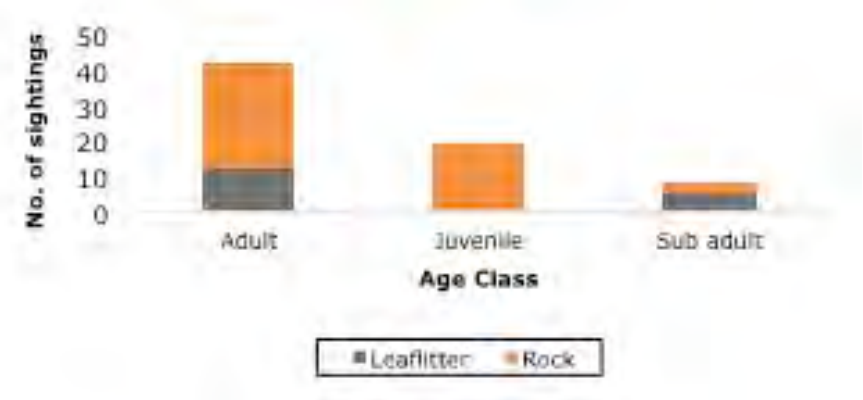
| Age Class | No. of sightings | Encounter rate | Temperature $^0$C | | | Humidity % | |
|---|---|---|---|---|---|---|---|
| | | | 28-31 | 31-33 | 33-35 | 40-60 | 60-70 |
| **Adult** | 42 | 2.30 | 11 | 16 | 15 | 31 | 11 |
| **Juvenile** | 19 | 1.03 | 5 | 12 | 2 | 19 | 0 |
| **Sub adult** | 8 | 0.43 | 2 | 6 | 0 | 6 | 2 |
| **Syntopic lizards (competitors)** 1.5 < *Calotes versicolor* 1.0 > *Sitana ponticeriana* 0.5 > *Psammophilus cf.dorsalis* | | | | | | | |

Table 2. Comparison of human activities and *Ophisops* sighting probability in Gingee hills

| Gingee Forest | No. of sightings | % of anthropogenic pressure |
|---|---|---|
| Siruvaadi hills (Ranikottai) | 0 | 23.3 |
| Muttakadu hills (Rajakottai) | 0 | 22.1 |
| Pakkam hills | 69 | 16.1 |
| Karai hills | 0 | 20.3 |
| Paadipallam hills | 7 | 18.2 |

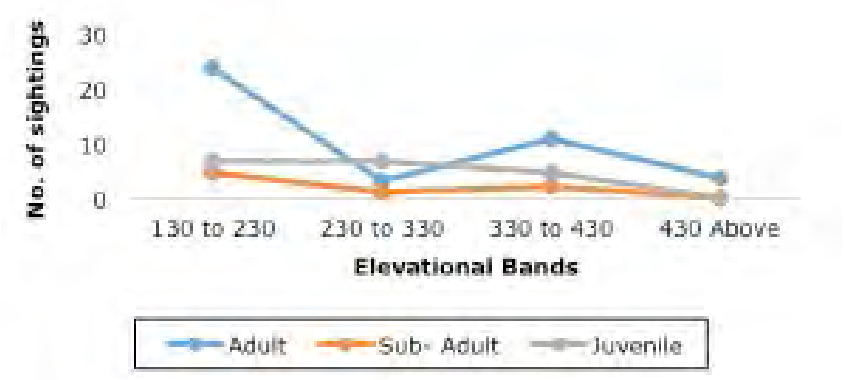
**Global Distribution:** Endemic to India and eastern Sri Lanka

the altitudinal data at the time of species encounter and found that the average elevation was between 130–459 m. Here, we observed altitude is an influencing factor because the Pakkam hills have a significant gradient compared with the other sub clusters of the Gingee hills. According to Kumar et al. (2017), of six sightings, five were recorded at an elevation of >200 m asl; this confines this species was observed in elevated regions and not plains. We also hypothesize that *Ophisops leschenaultii* strongly prefers an elevated plateaus and rocky outcrops because maximum sighting was observed between 200–459 m in the Pakkam hills. Human disturbance may also have influenced the sighting probability of *Ophisops* sp. However, the Gingee hills is frequently visited by people; therefore, we consider that anthropogenic pressure is one of the factors that influences the distribution of *Ophisops leschenaultii* (Table 2). Gingee rocky hills provide sufficient

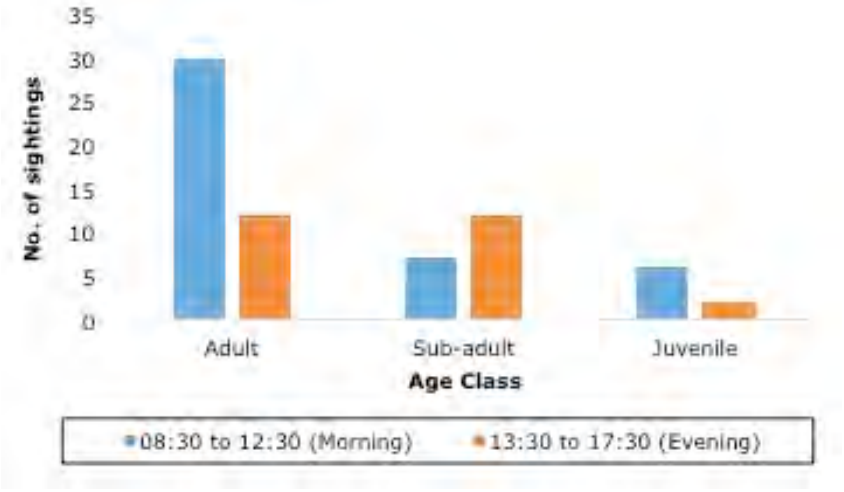



Micro-habitat utilized by *Ophisops leschenaultii* in Pakkam, Gingee hills


**Activity of *Ophisops leschenaultii* at the time of sighting**




**Elevational distribution of *Ophisops leschenaultii***




**DTCS sampling (After Ribiero-Junior et al. 2008)**

shelter to *Ophisops leschenaultii*, and most of the individuals were sighted in rocky habitats. Because the Eastern Ghats comprise almost an undulated rocky mountain chain and hillocks (Kalaimani 2011), they have abundant species richness and endemicity. However, these Ghats receive very little attention from the research community compared with the well-known Western Ghats (Kumar et al. 2017).

**Habitat and Conservation**

Habitat loss is the most important cause of species extinction. Extinctions from habitat loss are often delayed rather than immediate because many species that tend to linger in the habitat fragments do not have viable populations and are doomed to eventual local extinction (Newmark et al. 2017). *Ophisops leschenaultii* highly prefers open biomes, such as grassy and rocky habitats (Agarwal et al. 2017), and this species is mainly diurnal in its habit. The present study highlights rock (75.4% of individuals), followed by leaf litter (24.6% of individuals), as the species' highly preferred microhabitat. In addition, 52% of individuals were spotted while they were moving, whereas 49% of individuals were spotted while they were basking in their respective microhabitats. The main threats for this species

include anthropogenic pressure, stone quarrying, and forest fires, which degrade or destroy the grassy, leaf litter, and rocky microhabitats and result in considerable mortality and population decline (Srinivauslu et al. 2014; Kumar et al. 2017). Further longterm study is required to address the foraging behaviour of *Ophisops leschenaultii* and conservation effort to enhance the population viability in Gingee Hills.

**References**

**Agarwal, I. & U. Ramakrishnan (2017).** A phylogeny of open-habitat lizards (Squamata: Lacertidae: Ophisops) supports the antiquity of Indian grassy biomes. *Journal of Biogeography* 44(9): 2021–2032.
**Das, I. (2002).** *Photographic Guide to Snakes and Other Reptiles of India*. R. Curtis Books, UK, 144pp.
**Das, I. & A. de Silva (2005).** Photographic Guide to Snakes and Other Reptiles of Sri Lanka. New Holland, UK, 144pp.
**Ganesh, S.R. & S.R. Chandramouli (2017).** Identification of Leschenault's Snake-eyed Lizard, *Ophisops leschenaultii* (MiLneedwards, 1829), with notes on its ontogenetic colour change. *Sauria (Berlin)* 39(2): 68–72.
**Newmark, W.D., C.N. Jenkins, S.L. Pimm, P.B. Mcneally & J.M. Halley (2017).** Targeted habitat restoration can reduce extinction rates in fragmented forests. *PNAS* 114(36): 9635–9640.
**Kumar, G.C., C. Srinivasulu & K.K. Prasad (2017).** New Locality Records of Leschenault's Snake Eye, *Ophisops leschenaultii* (Sauria: Lacertidae) (Milne-Edwards, 1829) from Telangana State, with Notes on the Species' Natural History. *IRCF Reptiles & Amphibians* 24(1): 51–54.
**Kalaimani, A. (2011).** Birds of Gingee range, Villupuram District, Tamil Nadu, South India. *Newsletter for Bird Watchers* 51: 2.
**Srinivasulu, C., B. Srinivasulu & S. Molur (2014).** The Status and Distribution of Reptile's in the Western Ghats, India. Conservation Assessment and Management Plan (CAMP). Wildlife Information Laision Development Society, Coimbatore, Tamil Nadu, 141pp.
**Ribeiro-Junior, M.A., T.A. Gardner & T.C.S. Avila-Pires (2008).** Evaluating the effectiveness of herpetofaunal sampling techniques across a gradient of habitat change in a tropical forest landscape. *Journal of Herpetology* 42(4): 733–749.
**Venugopal, P.D. (2010).** An updated and annotated list of Indian lizards based on a review of distribution records and checklists of Indian reptiles. *Journal of Threatened Taxa* 2(3): 725–738; http://doi.org/10.11609/JoTT.o2083.725-38

**Acknowledgements:** We thank to AVC College and Vilupuram forest division for granting permission for this study. We also thank S.R. Ganesh for his kind support and motivation. PK & AK thanks to our colleagues Sridhar Halali and Deepika Karmaker for earlier comments. Finally we thanks to anonymous reviewer for giving valuable suggestion and comments.

**Pandi Karthik[1], Rathinalingam Nagarajan[2] & Ayuthavel Kalaimani[3]**
[1-3] Department of Zoology & Wildlife Biology, A.V.C. College (Autonomous), Mannampandal, Mayiladuthurai, Tamil Nadu 609305, India.
Email: [1]karthikwildlifebiology@gmail.com (Corresponding author)

Citation: Karthik, P., R. Nagarajan & A. Kalaimani (2018). Leschenault's snake-eye lizard: Ecology of *Ophisops leschenaultii* in Pakkam Hills, Gingee, Eastern Ghats, Southern India. Reptile Rap #186. In: *Zoo's Print* 33(7): 06-09

# RUSTY-SPOTTED CAT

## Distribution account of *Prionailurus rubiginosus* (Carnivora: Felidae) with comments on unusal irregularity observed in Gujarat, India

**The Rusty-spotted Cat *Prionailurus rubiginosus* with typical usual marking - typical tail without any bands, as sighted in Gir Wildlife Sanctuary (© Ankit Shukla)**

**IUCN Red List:**
Near Threatened
(Mukherjee et al. 2016)

**Mammalia**
[Class of Mammals]

**Carnivora**
[Order of Carnivores]

**Felidae**
[Family of cats]

***Prionailurus rubiginosus***
[Rusty-spotted Cat]

Species described by I. Geoffroy Saint-Hilaire in 1831

The Rusty-spotted Cat *Prionailurus rubiginosus*, smallest cats of the world is morphologically and biogeographically recognized by three subspecies (Kitchener et al. 2017); *P.r.rubiginosus* (Geoffroy Saint-Hilaire, 1831), *P.r.phillipsi* (Pocock, 1939) and *P.r.koladivius* (Deraniyagala, 1956). Of the three subspecies, the former one is distributed across India, Nepal (Lamichhane et al. 2016) and probably Pakistan too, whereas the latter two subspecies are confined to Sri Lanka (Pocock 1939; Prater 1980), across the dry and wet zones of the Sri Lankan landmass respectively (Deraniyagala 1956).

The appearance of Rusty-spotted Cat (RsC) fairly resembles to that of a domestic cat but can be distinguished principally by its smaller size. Other characteristics include

white underside of its neck, four vertical stripes on its forehead, cheeks marked with two streaks of darker rusty coloured fur, small and rounded ears, fawn coat with rusty-brown spots arranged in lines on the back, black paws and a long-unmarked tail equaling about half the combined length of the head and body (Sunquist & Sunquist 2002). It is legally protected as a Schedule I species under the Wildlife Protection Act-1972, India, in Appendix I of CITES (Indian population only) and is listed as "Near Threatened" in the IUCN Red List (Mukherjee et al. 2016).

**Global Distribution:**
India (Andhra Pradesh, Gujarat, Jammu-Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh), Nepal, Sri Lanka (Mukherjee et al. 2016)

**The Rusty-spotted Cat showing typical unusual color marks on the tail as rusty color bands, locality from Sivrajpur, Panchmahal, Gujarat (© Mital Patel)**

## Distribution in India

Earlier, the distribution of this secretive nocturnal cat was believed to be rare and sparse, with very little published literature, including the record from Gir Forest with few pictures of the species (Pathak 1990). But lately the species was recorded from many other Indian states, except northeastern. Confirming to its widespread distribution across the country (Nowell & Jackson 1996), including Pondicherry (GeoffroySaint-Hilaire 1831), Maharashtra (Abdulali 1945; Patel 2010), Tamil Nadu (Web-Peploe 1946; Guptha & Ramanujam 2017), Gujarat (Digveerendrasinh 1964, 1987; Pathak 1990; Chavan et al. 1991; Patel & Jackson 2005; Patel 2006, 2006a, 2011; Vyas et al. 2007; Shukla 2011; Singh 2013; Vyas & Upadhyay 2014, Devkar et al. 2016) Orissa (Behura & Guru 1969), Jammu & Kashmir (Chakraborty 1978), Rajasthan (Tehsin 1994; Sharma 2007; Nayak et al. 2017), Kerala (Jackson1998), Andhra Pradesh (Rao et al. 1999; Behera 2008; Aditya & Ganesh 2016), Karnataka (Kumara& Singh 2005), Uttar Pradesh (Anwar et al. 2010), Uttarakhand (Eco News 2011), Madhya Pradesh (Patel 2010; Vasava et al. 2012; Davate et al. 2015; Jena et al. 2016) and Haryana (Ghaskadbi et al. 2016).

Table 1. Sightings records of Rusty-spotted Cat (*Prionailurus rubiginosus*) from Gujarat

| | Date of sighting | Location site | Geo-coordi-nates | Animal | Vegetation | Timing |
|---|---|---|---|---|---|---|
| 1 | 10.iii.2014 | Bhat village, edge of Jambughoda WS, Panchmahal | 22º24'26.77"N 73º37'23.77"E | Adult | Agricultural fields & human habitation | Night |
| 2 | 22.viii.2015 | Champaner, Panch-mahal | 22º29'0.12"N 73º31'28.34"E | Adult | Reserve forest | Evening |
| 3 | 15.xi.2015 | Sukhi Dam, Panch-mahal | 22º26'34.80"N 73º52'20.23"E | Adult | Reserved forest & big boulders | Night |
| 4 | 25.i.2016 | Richhaya, Panchmahal | 22º29'39.90"N 73º35'41.71"E | | Scrub land & human habitations | Evening |
| 5 | 05.ii.2017 | Sirwan, Gir WS, Juna-gadh | 21º 6'5.36"N 70º40'11.40"E | Adult | Tieck Forest & human habitation | Night |
| 6 | 25.v.2017 | Hiran Dam, Gir WS, Junagadh | 21º11'56.03"N 70º40'35.89"E | Sub Adult | Tieck Forest, Wildlife Sanctuary | Mid Night |
| 7 | 26.viii.2017 | Shivrajpur, Panchmahal | -- | Adult | Human habitation | Morning |

## Distribution in Gujarat State

RcC is widely distributed in Gujarat State. It chiefly inhabits six protected areas of the state, namely Vansda National Park, Gir National Park & Sanctuary, Girnar Wildlife Sanctuary, Shoolpaneshwar Wildlife Sanctuary, Ratanmahal Wildlife Sanctuary and Jambughoda Wildlife Sanctuary; along with scattered sightings recorded from other reserved forests, farmlands, orchards and wilderness around village limits (Vyas & Upadhyay 2014). Range of habitat is vast; right from dry thorny scrublands of Kutch to wet deciduous forests of southern Gujarat (Vyas & Upadhyay 2014). Here, the authors identify two best potential habitats of the species in the state (high probability of sightings of the species, eight out of ten visits from some of pockets of forests of both PAs); dry deciduous forest blocks in and around Jambughoda Wildlife Sanctuary and Ratanmahal Wildlife

Rusty-spotted Cat with rusty color bands on tail, locality Chhari, Kutch, Gujarat (© J.K. Tiwari)

Sanctuary located in Central Gujarat; and wet deciduous forests in and between Vansda National Park and Purna Wildlife Sanctuary, located in Southern Gujarat.

## Methods

Scattered accidental sightings of RSC from last three years (2014–2017) across the state, including records from Gir Wildlife Sanctuary & National Park and Jambughoda Wildlife Sanctuary, have been presented here. Also, secondary records based on photographic evidence and relevant observations as collected from regional wildlife photographers and naturalists, has been analyzed. These indicate noteworthy variation in pelage pattern and widespread distribution of the species across various and forest types in the state.

## Observation and Results

All the Rusty-spotted Cats sightings recorded during the study period across the state have been mentioned in Table 1. All of the sighted Rusty-spotted Cats were noted to have variation in pelage pattern, except those sighted from Bhat village (edge of Jambughoda WS, Panchmahal), Sirvan (Gir Wildlife Sanctuary, Junagadh) and Shivrajpur (Panchmahal) – which were normal (see: GeoffroySaint-Hilaire, 1831; Pocock, 1939; Kitchener et al. 2017). The only dissimilarity observed in these normal sightings was 6-8 rusty colored bands on the tails of each cat. These tail markings do not match with the species description of RSC (Saint-Hilaire 1831; Pocock 1939; Prater 1980; Jackson 1998). All the secondary data collected through personal inquires with wildlife photographers and

**Table 2. Details of photographic records of Rusty-spotted Cat *Prionailurus rubiginosus* from Gujarat (2011–2017)**

| | Date of Sighting | Location Site | Geo-coordinates | Source: Photo | Remarks |
|---|---|---|---|---|---|
| 1 | 27.ix.2011 | Bordevi, Girnar Wildlife Sanctuary (WS), Junagadh | 21°28'46.07"N 70°32'7.06"E | Ankit Shukla, Junagadh | Tail with Bands |
| 2 | 01.iii.2012 | Shivjipur, Panchmahal | 22°26'27.87"N 73°46'53.09"E | Mittal Patel, Vadodara | Tail with Bands |
| 3 | 04.viii.2012 | Dhanimata, Jambughoda | 22°21'26.25"N 73°42'52.45"E | Kartik Upadhayay | No band on tail |
| 4 | 24.xii.2013 | Sukhi Dam, Chhota Udepur | -- | Manoj Thakar, Vadodara | Tail with Bands |
| 5 | 23.v.2014 | Girnar WS, Junagadh | 21°31'39.22"N 70°30'34.18"E | Ankit Shukla, Junagadh | No band on tails |
| 6 | 09.i.2015 | Girnar WS, Junagadh | -- | Ankit Shukla, Junagadh | No band on tail |
| 7 | 25.xi.2016 | Chhari, Kutch | 23°33'51.89"N 69°18'52.41"E | J. K. Tiwari, Kutch | Tail with Bands |

**Box 1: What is hybridization?**

The hybridization is defined as interbreeding between genetically distinct populations (Harrison 1993). Hybridization between closely related species is a natural phenomenon that has been observed in all major plant and animal taxa (Dowling & Secor 1997). Most zoologists do not support hybridization; as it is an unnatural process; as opposed to botanists, who approve upon the importance of plant hybridization (Mallet 2005). In animals, hybridization may be more likely in poor habitats or small populations, where mate availability is low/imbalanced and skewed sex ratios are prevalent. This may lead to elimination of some individuals from mating (Jansson et al. 2007). Animal hybridization is harmful to conservation (Allendorf et al. 2001) and to ecological/evolutionary processes (Seehausen et al. 2005). Spontaneous hybridization, as it occurs in nature, may have a significant impact on the formation of domestic breeds, but can also affect the genetic integrity of domestic and wild species. Hybridization should be promoted when it is utmost necessary to maintain deteriorating populations; otherwise it should be prevented when it threatens rare species (Levin 2002).

**References**

**Allendorf, F.W., R.F. Leary, P. Spruell & J.K. Wenburg (2001).** The problems with hybrids: setting conservation guidelines. *Trends in Ecology & Evolution* 16(11): 613–622.
**Dowling, T.E. & C.L. Secor (1997).** The role of hybridization and introgression in the diversification of animals. *Annu. Rev. Ecol. Syst*., 28: 593–619.
**Harrison, R.G. (1993).** Hybrids and hybrid zones: Historical perspective. In: Harrison, R.G. (ed.). *Hybrid Zones and the Evolutionary Process.* Oxford University Press, New York.
**Jansson, G., C.G. Thulin & A. Pehrson (2007).** Factors related to the occurrence of hybrids between brown hares Lepuseuropaeus and mountain hares L-timidus in Sweden. *Ecography* 30: 709–715.
**Levin, D.A. (2002).** Hybridization and extinction: in protecting rare species, conservationists should consider the dangers of interbreeding, which compound the more well-known threats to wildlife. *American Scientist* 90(3): 1–6.
**Mallet, J. (2005).** Hybridization as an invasion of the genome. *Trends in Ecology & Evolution* 20(5): 229–237.
**Seehausen, O., G. Takimoto, D. Roy & J. Jokela (2008).** Speciation reversal and biodiversity dynamics with hybridization in changing environments. *Molecular Ecology* 17(1): 30–44.

naturalists along with photographs compiled from various sources has been mentioned in Table 2. The photographs of RSC from Girnar Wildlife Sanctuary, Junagadh, Sivrajpur, Panchmahal and Chhari, Kutch have been helpful to distinguish the typical rusty colored bands (6–8 bands in numbers) on the cats' tails. In totality, this information about color morph in Rusty-spotted Cat found or sighted around human habitations-indicates the presence of unusual color morphism in the species.

## Discussion

The unusual presence of these rusty bands on the cats' tails further indicate two possibilities; firstly, a result of interbreeding between Rusty-spotted Cat and feral/domestic cats, and secondly a possibility of sub-speciation.

On the basis of data collected during the study, authors could surmise upon the existence of a hybrid cats – relating to the cats, which had 6–8 rusty coloured bands on their tails thus not being pure bred wild RSC animals. Such hybridization is a likely to be caused when RsC breed with domestic cats. Earlier, Kittle & Watson (2004) noted mating

between a Rusty-spotted Cat and a domestic cat in a dry forest on the boundaries of Yala National Park, Sri Lanka. Another observation (Webb 2007) also featured similar hybrid-Rusty-spotted Cat characteristics, typically a banded tail, in a Rusty-spotted Cat found at Konduruwawa, Sri Lanka. There have been a number of incidents involving occurrences of hybrid wild cats (about eight species of wildcats); either due to natural selection or due to captive conditions when retained with domestic cats (Hartwell 2013). Vyas (unpub. obs., 1998) noted a peculiar case of hybrid Jungle Cat Felis chaus at Hingolgadh Wildlife Sanctuary (Rajkot, Gujarat). The animal would regularly visit his parent's newborn offspring and feed along with them. Hybridization (Box 1) between species may occur if closely related species share an over lapping habitat. Hybrid offspring may combine desired properties of the parental species (Forsdyke 2000; Vyas 2009); similar to the cases and possibilities as observed for RSC of Gujarat State. It is a very wild guess without any genetic analysis. On the basis of photographs, it is not possible to come to any conclusion.

**An adult Rusty-spotted Cat showing rusty color bands on tail, locality from Panchmahal, Gujarat (© Manoj Thaker)**

Earlier, Vyas & Upadhyay (2016) stated that the species status is uncommon pertaining to the adverse impact of a direct threat - road network. This was an alarming discovery suggesting that the rapid urbanization and infrastructural development across the state may result in habitat loss and alteration. However, with the present study and its findings, hybridization now can be identified as a major threat to Rusty-spotted Cat, which could result in eroding the genetic integrity of the species (Bambaradeniya 2006). The hybridization in Rusty-spotted Cat is an insidious threat for such quondam species, which belongs to a very old lineage of felines as per the phylogeny of genetic uniqueness and diversity.

There's another possibility, suggestive of an unknown sub-speciation of Rusty-spotted Cat to have occurred due to the endemic habitat. The likelihood of this cannot be denied due to the extensive and widespread distribution of subspecies *P. r. rubiginosus*

**A juvenile of hybrid Jungle Cat (*Felis chaus*), locality Hinglogadh Wildlife Sanctuary, Rajkot, Gujarat (© Raju Vyas)**

across the Indian subcontinent - ranging from foothills of Himalayas (parts of Nepal) to further Southern peninsular areas across Tamil Nadu (India) (Kitchener et al. 2017). The distribution range spans across different climatic zones and several habitat types inhabiting only one known subspecies in contrast to the much smaller distribution area inhabited by other two subspecies of *P.r. phillipsi* and *P.r. koladivius*, exclusive to the island of Sri Lanka (Kitchener et al. 2017).

Current observation and evidences further call for a detailed methodological study to confirm one of the two possibilities discussed hereby. Further discussion requires DNA sequencing and molecular analysis to deduce if the abnormal sightings belong to a hybrid population of Rusty-spotted Cat or an undescribed sub-species.

**References**

**Abdulali, H. (1945).** Northern limits of the Rusty-spotted Cat (*Prinalurus r. rubiginosa* Geoff.). *Journal of Bombay Natural History Society* 45: 600–601.

**Aditya, A. & T. Ganesh (2016).** Camera trap records of Rusty-spotted Cat *Prionailurus rubiginosus* and Leopard Cat *Prionailurus bengalensis* (Mammalia: Carnivora: Felidae) from Papikonda National Park, northern Eastern Ghats, India. *Journal of Threatened Taxa* 8(5): 8818–8819; http://doi.org/10.11609/jott.2401.8.5.8818-8819

**Anwar, M., H. Kumar & J. Vattakavan (2010).** Range extension of Rusty-spotted Cat to the Indian Terai. *Cat News* 53: 25–26.

**Bambaradeniya, C.N.B. (ed.) (2006).** *Fauna of Sri Lanka: Status of Taxonomy, Research and Conservation.* The World Conservation Union,Colombo, Sri Lanka & Government of Sri Lanka, viii+308pp.

**Behera, S. (2008).** Rusty-spotted Cat in Nagarjunasagar Srisailam Tiger Reserve. *Cat News* 48, 19.

**Behura, B.K. & G.B. Guru (1969).** Wildlife of Orissa. Prakruti. Utkal University. *Journal Science* 6(2): 95–96.

**Chakraborty, S. (1978).** The Rusty-spotted Cat *Felis rubiginosa* I. Geoffroy in Jammu and Kashmir. *Journal of the Bombay Natural History Society* 75: 478–479.

**Chavan, S.A., C.D. Patel, S.V. Pawar, N.S. Gogate & N.P. Pandya (1991).** Sighting of the Rusty-spotted Cat *Felis rubiginosa* Geoffroy in Shoolpaneshwar Sanctury, Gujarat. *Journal of the Bombay Natural History Society* 88: 107–108.

**Davate, M., N. Chatterjee, A. Dashahre, B. Habib, P. Nigam, M. Trivedi, G. P. Garad, A. Kalaskar & P. Ghaskadbi (2015).** Recent records of Rusty-spotted Cat in dry deciduous forest of Tadoba, Maharashtra, India. *Cat news* 62: 15.

**Deraniyagala, P.E.P. (1956).** A new subspecies of Rusty-spotted Cat from Ceylon. *Spolia Zeylanica* 23: 113–114.

**Devkar, R., R. Bhatt & K. Upadhyay (2016).** Rusty-spotted Cat predating on bats. *Cat News* 64: 27–28.

**Digveerendrasinh, M.S. (1964).** Occurrence of the Rusty-spotted Cat *Felis rubiginosa* Geoffroy in South Gujarat. *Journal of the Bombay Natural History Society* 61(1): 179.

**Digveerendrasinh, M.S. (1987).** Sighting of a Rusty-spotted Cat (*Felis rubiginosa*). *Journal of the Bombay Natural History Society* 84(1): 200.
**Eco News (2011).** *Highly endangered cat species spotted in Corbett* (http://zeenews. india. com/news/eco-news/highly-endangered-cat-species-spotted-in-corbett_725829. html), Zee News Limited, 12 August 2011,
**Forsdyke, D.R. (2000).** Haldane's rule: hybrid sterility affects theheterogametic sex first because sexual differentiation is on the path tospecies differentiation. *Journal of Theory Biology* 204: 443–452.
**Ghaskadbi, P., B. Habib, Z. Mir, R. Ray, G. Talukdar, S. Lyngdoh, B. Pandav, P. Nigam & A. Kaur (2016).** Rusty-spotted Cat in Kalesar National Park and Sanctuary, Haryana, India. *Cat news* 63: 28–29.
**Guptha, M.B. & M.E. Ramanujam (2017).** A photographic record of the Rusty-spotted Cat *Prionailurus rubiginosus* (Mammalia: Carnivora: Felidae) in a forest plantation on the east coast of Tamil Nadu, India. *Journal of Threatened Taxa* 9(5): 10242–10245; http://doi.org/10.11609/jott.3239.9.5.10242-10245
**Geoffroy-Saint-Hilaire I. (1831).** Mammiferes. In: Belanger C. (ed.). Voyage aux Indes-Orientales par le nord de l'Europe, les provinces du Caucases, la Georgie, l'Armenie et la Perse, suivi des details topographiques, statis-tiques et autre sur le Pegou, les Iles de Jave, de Maurice et de Bourbon, sur le Cap-de-bonne-Esperance et Sainte-Helene, pendant les annees 1825, 1826, 1827, 1828 et 1829 publie sous les auspices de ll. ee. mm. les Ministres de la Marine et de l'Interieur, 3. Zoologie. Arthus Bertrand, Paris.
**Hartwell, S. (2013).** Domestic and wildcat hybrid. http://messybeast.com/small-hybrids/hybrids.htm. Access on 27th December, 2017.
**Jackson, P. (1998).** Conserving the smaller cats. *ENVIS Newsletter* 1(2): 1–4.
**Jena, J., S. Dey, J. Borah & D. Bhargava. (2016).** Occurrence of Rusty-spotted Cat in Balaghat forest division, Madhya Pradesh, India. *Cat News* 64: 15–16.
**Kaushik, K. (2009).** Rusty-spotted Cat sighted in Indroda park. The Times of India, 23rdJanuary, 2009. (Ahmedabad Edition).
**Kitchener, A.C., Breitenmoser-Wursten Ch., Eizirik E., Gentry A., Werdelin L., Wilting A., Yamaguchi N., Abramov A. V., Christiansen P., Driscoll C., Duckworth J. W., Johnson W., Luo S.-J., Meijaard E., O'Donoghue P., Sanderson J., Seymour K., Bruford M., Groves C., Hoffmann M., Nowell K., Timmons Z. & S. Tobe (2017).** A revised taxonomy of the Felidae. The final report of the Cat Classification Task Force of the IUCN/SSC Cat Specialist Group. *Cat News Special Issue* 11: 80pp.
**Kittle, A. & A. Watson (2004).** Observation of an arid zone population of Rusty-spotted Cat (*Prionailurus rubiginosa* phillipsi) in Sri Lanka. *Cat news* 40: 17–19.
**Kumara, H.N. & M. Singh (2005).** The occurrence of Rusty-spotted Cat *Prinalurus rubiginosa* (Geoffroy) in Nugu Wildlife Sanctuary, Karnataka. *Journal of the Bombay Natural History Society* 102(3): 336–337.
**Lamichhane, B.R., R. Kadariya, N. Subedi, B.K. Dhakal, M.Dhakal, K. Thapa & K.P.Acharya (2016).** Rusty-spotted Cat: 12th cat species discovered in western terai of Nepal. *Cat News* 64: 30–33.
**Mukherjee, S., J.W. Duckworth, A. Silva, A. Appel & A. Kittle (2016).** *Prionailurus rubiginosus*. The IUCN Red List of Threatened Species 2016: e.T18149A50662471. Downloaded on 09 July 2018; http:// doi.org/10.2305/IUCN.UK.2016-1.RLTS.T18149A50662471.en
**Nayak, S., S. Shah & J. Borah (2017).** First record of Rusty-spotted Cat *Prionailurus rubiginosus* (Mammalia: Carnivora: Felidae) from Ramgarh-Vishdhari Wildlife Sanctuary in semi-arid landscape of Rajasthan, India. *Journal of Threatened Taxa* 9(1): 9761–9763; http://doi.org/10.11609/jott.3303.9.1.9761-9763
**Nowell, K. & P. Jackson (1996).** *Rusty-spotted Cat Prionailurus rubiginosus* (http://www.catsg.org/catsgportal/ cat-website/ catfolk/rubig01. htm) In: Wild Cats: status survey and conservation action plan. IUCN/SSC Cat Specialist Group, Gland, Switzerland
**Patel, K. (2006).** Observations of Rusty-spotted Cat in eastern Gujarat, India. *Cat News* 45: 27.
**Patel, K. (2006a).** Rusty-spotted Cat. *Hornbill* Jan-Mar: 35.
**Patel, K. (2010).** New distribution record data for Rusty-spotted Cat from Central India. *Cat News* 53: 26–27.
**Patel, K. (2011).** Preliminary survey of small cats in Eastern Gujarat, India. *Cat News* 54: 8–11.
**Patel, K. & P. Jackson (2005).** Rusty-spotted Cat in India: New distribution data. *Cat News* 42: 27.
**Pathak, B.J. (1990).** Rusty-spotted Cat *Felis rubiginosa* Geoffroy: a new record for Gir Wildlife Sanctuary and National Park. *Journal of the Bombay Natural History Society* 87: 445.
**Prater, H.S. (1980).** *The Book of Indian Animals - Revised Edition*. Bombay Natural History Society and Oxford University Press, Bombay.
**Pocock, R.I. (1939).** *The Fauna of British India, including Ceylon and Burma. Mammalia. Volume 1* http://www.archive.org/stream/PocockMammalia1/pocock1#page/n351/mode/ 2up). Taylor and Francis, Ltd., London, 276–280pp.
**Rao, K.T., D. Sudhakar, V. Vasudevarao, V. Nagulu & C. Srinivasulu (1999).** Rustyspotted Cat *Prinalurus rubiginosa*: A new record for Nagarjunsagar Srisailam Tiger Reserve, Andhra Pradesh. *Journal of the Bombay Natural History Society* 96: 463–464.
**Sharma, S.K. (2007).** Breeding season of Rusty-spotted Cat *Prinalurus rubiginosa* (Geffroy) in Sajjangarh Wildlife Sanctuary, Udaipur District, Rajsthan, India. *Zoos' Print* 22(10): 2874.
**Shukla, A. (2011).** Rusty-spotted Cat. Access on 27th December 2017; http://www.indianaturewatch.net/displayimage.php?id=266922
**Singh, H.S. (2013).** *Mammals in Gujarat.* Gujarat Forest Department and Gujarat Biodiversity Board, Gandhinagar, 299pp.
**Sunquist, M. & F. Sunquist (2002).** Wild Cats of the World. The University of Chicago Press, Ltd., London, 452pp.

**Tehsin, R. (1994).** Rusty-spotted Cat *Prinalurus rubiginosa* Geoffroy Sighted near Udaipur. *Journal of the Bombay Natural History Society* 91: 136.
**Vasava, A., C.M. Bipin, R. Solanki & A. Singh (2012).** Record of Rusty-spotted Catfrom Kuno Wildlife Sanctuary, Madhya Pradesh, India. *Cat News* 57: 22–23.
**Vyas, R. (2009).** An example of hybridization between two gull species in captivity. *Flamingo Newsletter of BCSG* 7(1&2): 3–5.
**Vyas, R. & K. Upadhyay (2014).** Sighting and distribution of Rusty-spotted Cat in Gujarat State, India. *Cat News* 61: 26–29.
**Vyas, V.V., J.J. Lakhmapurkar & D.J. Gavali (2007).** Sighting of Rusty-spotted Cat from new localities in central Gujarat. *Cat News* 46: 18.
**Web-Peploe, C.G. (1946).** Field notes on the mammals of south Tinnevelly, South India. *Journal of Bombay Natural History Society* 46: 629–644.
**Webb, R. (2007).** Sri Lanka: 21-31,http://www.mammalwatching.com/Oriental/ Otherreports/RW%20SRI_LANKA%20 2007.pdf. Access on 23rdDecember 2017

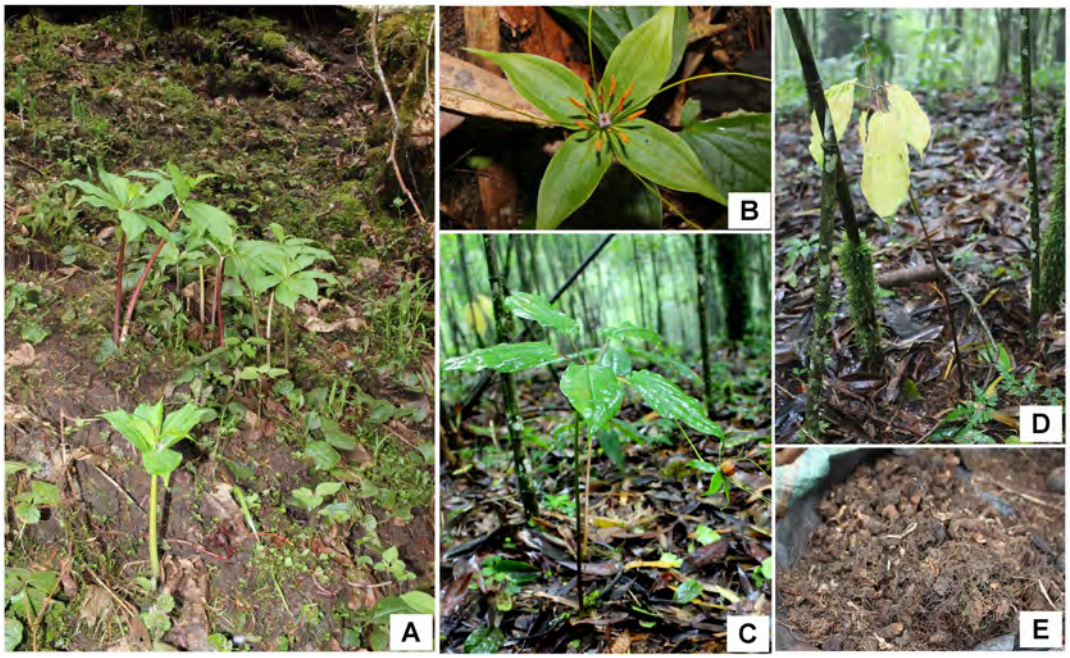
**Acknowledgements:** I am very thankful to the Deputy Conservator of Forest (DCF), Gir National Park & Sanctuary and DCF - Jambughoda Wildlife Sanctuary, Gujarat for the support and logistic help. Special thanks to Kartik Upadhay, Mittal Patel, Rahul Bhatt, Ankit Shukla, Pranav Vaghashiya, Jugal Kishor Tiwari and Mr. Manoj Thakar for accompanying us in the field, and sharing information and images. I thank K.R. Vyas for her help towards preparing maps/drawings and draft of the manuscript.

**Raju Vyas**[1], **Ankit Shukla**[2] **& Pranav Vaghashiya**[3]
[1]Krishnadeep Tower, Mission Road, Fatehgunj, Vadodara-Gujarat 390002, India. Email: razoovyas@hotmail.com (corresponding author)
[2]21, Shree Harinagar Bunglow, Nr. Dargaah, Meeranagar Road, Junagadh, Gujarat 362001, India
[3]193, Amrutam, Bapunagar Society, B/H Gaytri School, Joshipura, Junagadh, Gujarat 362002, India

Citation: Vyas, R., A. Shukla & P. Vaghashiya (2018). Rusty-spotted Cat: Distribution account of *Prionailurus rubiginosus* (Carnivora: Felidae) with comments on unusual irregularity observed in Gujarat, India. Small Mammal Mail #419. In: *Zoo's Print* 33(7): 10-18

# TAMMA

## Report on unsustainable wild collection of *Paris polyphylla* (Smith, 1813), a high valued medicinal plant from Dibang Valley, Arunachal Pradesh, India




A - *Paris polyphylla* in its natural habitat; B - *P. polyphylla* in flowering stage; C - Mature seed; D - Plant started withering; and E - Dry rhizomes of the plant

**Plantae**
(Plant Kingdom)

**Liliales**
(Order of monocotyledonous flowering plants )

**Melanthiaceae**
(Family of flowering perennial herbs)

***Paris polyphylla***
(Tamma)

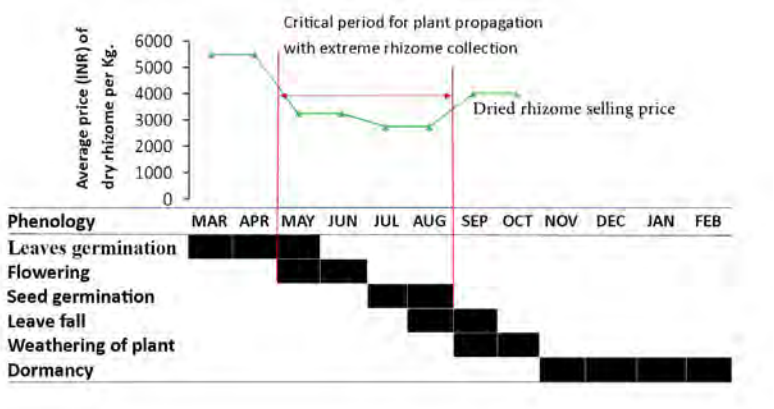
Species described by Smith in 1813

The *Paris polyphylla* (Smith, 1813) locally called "Tamma" in Idu-Mishmi means "medicine", is a vulnerable Asian plant species in Nepal (Madhu et al. 2010). The rhizome of this species is rich in numerous active phytochemical compounds with high medicinal properties (IUCN 2004; Sharma et al. 2015); traded illegally with high international demand especially from traditional Chinese medicine production (Negi et al. 2014; Paul et al. 2015). The traditional use of this plant was known by the local people residing to the vicinity of naturally growing sites in Dibang Valley. It is used by the Traditional Chinese Medicine (TCM) System for

the treatment of cancer (Mao et al. 2009). This practice threatens vegetative propagation of this species followed due to exploitation. This report is about unsustainable collection of P. polyphylla in large scale from last several years from Dibang Valley.

The *P. polyphylla* is a broad-leaved perennial plant species (Family: Melanthiaceae); grows 10 to 100cm tall; the leaves 5–10 rarely up to 22. Stem stout, rhizome creeping and segmented; the flowers are spider like, terminal, greenish at the apex, hermaphrodite, subtended by 4–9 lanceolate long-pointed leaf-like bracts. It has distribution from tropical to temperate region of Indian Subcontinent particularly in Bhutan, China, India, Laos, Myanmar, Nepal, Thailand and Vietnam (Paul et al. 2015).

The present study was conducted during March 2015 to December 2016 from Dibang Valley of Arunachal Pradesh (28$^0$42'N & 95$^0$42'E) situated in the foothills of eastern Himalaya. The species distribution was recorded at different forest patches of altitudinal range 2,000–3,500 m. It grows in moist forest with thick canopy cover; humus rich soil; rhododendron and bamboo forest with low light intensity; and sloppy areas near streamside. New leaves sprout in the beginning of March that continues until May. The flowering period is from the end of May to June followed by seed setting during July and August; leaves fall during August to September. The weathering of plant observed during September to October. In November upper plant parts dies and the plant remain dormant for four months (November to February).




**Schematic representation of reproductive phenology of *P. polyphylla* and selling price of dried rhizome at different months**

Rhizome collection of this species started with the germination of new leaves and continued till leaves fall (March to October).

We observed that fresh rhizomes were sold in the local market at INR 300–400/kg and dry rhizomes at INR 5,000–6,000/kg during early season

(March–April). It was primarily sold by the local villagers to agents who subsequently sell it to other traders. It is reportedly sent to China via Myanmar (Basar 2014; Mao et al. 2009). Illegal trade of the rhizomes has also been reported from West Kameng, Lower Dibang Valley and Lower Subansiri (Paul et al. 2015) in Arunachal Pradesh. Mao et al. (2009) reported its illegal trade from Manipur, Nagaland, Meghalaya and Arunachal Pradesh.

We observed that price gradually decreases upto INR 2,500/kg for dried rhizome when more number of people start collecting the rhizome. However, value for the fresh rhizome remained constant throughout the year. We have reported more availability of the species during May–August and high collection, this results decline in selling price of dried rhizome by traders/middle men and thus enhanced local people to collect more and to get a good amount for their sale. Although not studied thoroughly, such mass collection of the rhizome of this species most likely to have impact on its regeneration and population in future as collection is done by complete uprooting of the whole plant irrespective of its life stage. Therefore, unsustainable and unscientific collection of this species from its natural habitat would increase vulnerability of this species in the region.

Concerned over illegal rhizome collection and trading, the Arunachal Pradesh State Medicinal Plants Board (APSMPB) once banned rhizome sale during 2012 and 2013 (The Arunachal Times 2016). However, the ban has no impact on collections. It is important to highlight such mass extraction of *P. polyphylla* from the study area to create awareness among concerned authorities so that rhizome collection and sale is regulated for the conservation of the species. We also recommend study on ecology and economics of this species for future sustainable harvest through cultivation. Further, the community leaders may play a vital role in regulating collection and minimize harvest by imposing customary rules and regulations to ensure that sustainable harvest leads to conservation of this species for future generation.

**References**
**The Arunachal Times (2016).** Legalize collection of *Paris Polyphylla*. http://www.arunachaltimes.in (17th October 2016).
**Kew World Checklist of Selected Plant Families:** http://apps.kew.org/wcsp. (Assessed on 23 march 2017).
**IUCN Nepal (2004).** *National Register of Medicinal and Aromatic Plants (Revised and Updated).* IUCN - The World Conservation Union, Kathmandu, Nepal, xiii+202pp.
**Madhu, K.C., S. Phobooand & P.K. Jha (2010).** Ecological study of *Paris polyphylla* sm. *Ecoprint* 17: 87–93.
**Mao, A.A., T.M. Hynniewta & M. Sanjappa (2009).** Plant Wealth of Northeast India with Reference to Ethnobotany. *Indian Journal of Traditional Knowledge* 8: 96–103.
**Negi, J.S., V.K. Bisht, A.K. Bhandari, V.P. Bhatt, P. Singhand & N. Singh (2014).** *Paris polyphylla*: chemical and biological prospectives. *Anti-cancer Agents in Medicinal Chemistry* 14(6): 833–839.
**Paul, A., P.R. Gajurel & A.K. Das (2015).** Threats and conservation of Paris polyphylla an endangered, highly exploited medicinal plant in the Indian Himalayan Region. *Biodiversitas* 16(2): 295–302.
**Sharma, A., P. Kalita & H. Tag (2015).** Distribution and phytomedicinal aspects of Paris polyphylla Smith from the Eastern Himalayan Region: A review. *Association of Humanitas Medicine* 5(3): 1–12.

**Acknowledgements:** Authors are grateful to Aaranyak, Rufford Small Grant Foundation (RSGF), KWEF (Kurita Water and Environment Foundation) for financial assistance to conduct the study. We are thankful to the Department of Environment and Forests, Arunachal Pradesh for providing necessary permission. We thank Ahi Mihu, Aape MK, Naba Durga and Nabaliya Rasup Tayu for their valuable support in the field.

**Jayanta K. Roy[1], Ramie H. Begum[2] & M. Firoz Ahmed[3]**
[1&2] Department of Life Science & Bioinformatics, Assam University, Diphu Campus, Karbi Anglong, Assam 782460, India
[3] Herpetofauna Research and Conservation Division, Aaranyak, 13 Tayab Ali Byelane, Bishnu Rabha Path, Beltola Tinali, Beltola, Guwahati, Assam 781028, India
Email: [1]roy.jayantakumar47@gmail.com (Corresponding author)

Citation: Roy, J.K., R.H. Begum & M.F. Ahmed. (2018). Tamma: Report on unsustainable wild collection of *Paris polyphylla* (Smith, 1813), a high valued medicinal plant from Dibang Valley, Arunachal Pradesh, India. Plantasia #7, In: *Zoo's Print* 33(7): 19-22

# Interpretation techniques with Cartoon and Humour elements are more effective and attract more visitors in zoos

Gone over the days when the information about the animal exhibited were a name board with species name in both English and regional language. Although names of the exhibited animal are one of the essential components of the information boards, visitors like to know some very interesting information about the animal. But, such information should be very brief and, the visitors rarely read long messages in whatever ways they are interesting. Now a days, even brief information is neglected by most of the visitors. Here, two issues are involved – firstly, the animal exhibited is not attractive to the visitors and, secondly, there is no elements in the information method that arouse interest among the visitors. In this respect the author had suggested several means of how to induce the visitors to visit the neglected exhibits and how to arouse interest among the visitors to go through the messages (Paulraj, 1992a and 1992b).

Interactive interpretation techniques are the main components of interpretive planning in many modern zoological parks. Recent developments in technology paved way to introduce advanced electrical and electronics systems in developing some interesting interactive exhibits by spending huge amounts as in the case of 'Disney world'. However, such interactive exhibits with exorbitant cost is not possible for the zoos in developing countries like India. Here, we are suggesting some simple but effective interpretation techniques that could not only attract more visitors to go through the messages but also easily understandable.

**Humourous cartoon messages as an effective interpretation techniques**

Although humour component is widely used in advertisements involving business promotion (Weinberger, M.C & Gulas, C.S, 1992), it is not finding a place in any awareness and nature education programmes including zoo education. In this respect, Zoo Outreach sign boards and products are playing a significant role in using humour elements in many of its messages. The popular being the a cartoon message showing


**A cartoon message near Iguana enclosure in Chennai Snake Park, induce visitors to go through the message (Concept and design by Sally Walker, ZOO)**

the nature of treatment that zoo animals are facing by the visitors. Here the message is effectively communicated by a simple cartoon.

In Chennai Snake Park, we tried one such information board near Iguana enclosure, only with cartoon pictures highlighting some interesting behavioural facts. When we studied the visitor behaviour near the Iguana enclosure, more number of visitors started to read this information chart ignoring the simple routine name boards. This experiment made us to think to go for more such signage with humour elements. Here are some of such messages that the author has developed that are suited for any zoos.

Firstly, an important part of any interpretive techniques is that it must induce the visiting public to visit any particular exhibit that is often ignored due to its 'unattractive' nature. There may be some vital information on some conservation importance about a species. Yet, due to its 'unattractiveness' visitor often tend to ignore it. Examples are, sparrows and Gyps vulture. Unless we induce the visitors by employing some innovative methods, we fail to convey the important messages that are of more conservation value. In this respect Paulraj (1992a, 1992b and 1993) already discussed various ways and means. However, he missed to mention the role of humour components.

Choosing a subject to add any humour component needs creative and innovative thinking. The basic need is that the message should need a component that are widely known or read. This may be a historical, social, religious etc. facts. When we choose a message for an exhibit, we have to analyze what sort of component should be more appropriate for the chosen message and decide. We will discuss here how to decide and add humour value to our chosen messages with examples.

Firstly, humourous cartoon pictures are primary need. Secondly, the message with the humour component needs to be mixed. Both together will improve the message dissemination value. Sometimes either cartoon pictures alone or humourous message alone suffice to convey the message. However, the mixture of these two does has a higher value than the single.

**Examples of cartoon picture alone**

The Green Iguana is an interesting animal that has got many amazing facts. The following are a few: 1. Iguanas have a third eye located on the top of the head. This enable them to predict the presence of predators above. 2. Iguanas have the capacity to thrive without injury even when they fall from a height of 50 meters. Simply writing this message on the information board may not have better value for two reasons: 1. Visitors

**A cartoon message near Iguana enclosure in Chennai Snake Park, induce visitors to go through the message**

normally avoid reading any written messages on the board secondly, there is always a language barrier for the visitors who do not know the language of the message. Here, we used the local language, the Tamil, for the benefit of local rural people. The cartoonish type of information would be more appropriate.

**Example of message alone**

Many times short tile messages induce interest. The newspaper media and visual media are very specific in choosing the titles for the news. We may also employ such interesting and attractive titles to get the visitors attention. For example while preparing the information board tile for the bird, Ibis, we choose a title connected with its family life. Instead of giving a routine title like, “Family life of Ibises”, we have chosen the following tile that surely attract the visitors attention: “The Romantic Ibises”. This was suitably translated into the regional language, the Tamil. Sometimes some interesting questions also attract visitors attention. Here, after reading the question, the visitors are induced to know the answer. They are then asked to get the answer by visiting the targeted animal enclosure.


**The information board the title of which is not only attractive but also with humor element**

**Mixing of cartoon pictures and humourous messages**

Some animals such as frogs, monkeys etc., are often used as a symbol of humour. Signage for these animals could easily be made with cartoons and humourous messages. For example, some of the frogs are known for their amazing jumping capacity. Here the appropriate cartoon should be a picture of a comparison of an Olympic pole-vault jumper and the frog. This cartoon even without a written message, conveys the amazing jumping capacity of the frog, that too in an interesting way.


**Posing some interesting questions induces the visitors to go through the message. Here, the visitors, after reading the question, will search for the answer near the designated enclosure**

Chimpanzees are the most playful animals and many of their behaviours are comparable with that of man's. It would be therefore, appropriate to compare some of the man's behaviours with chimpanzees in a humourous way in order to express their interesting behaviours. For example, the following facts about the chimpanzees are depicted by comparing similar behaviours of man: "In the wild, female chimpanzees typically give birth only once every five years". This message not only convey an interesting fact about Chimpanzee's reproductive behaviour but also it emphasize the need for following this behaviour by man in order to lead a healthy and comfortable life.

A visitor behaviour study would bring out the real value of the signage with cartoon and humour components in the interpretive techniques in the zoos.

**This cartoon without any written message conveys the fact about the amazing jumping capacity of the frog**


**Fact: The best jumper among the frogs is the South American Sharp-nosed Tree frog. It has been recorded to jump over 30 feet high – which is higher than the highest Olympic record in Pole vault (6.15 m.)**

**The humorous message not only conveys an interesting fact about Chimpanzees but also conveys the importance of a small family as advocated by the Indian Government**

**References**

**Paulraj, S. (1992a).** Improve your Interpretation Techniques in Zoos. Part I. Arousing Interest. *Zoos' Print*, 7(7): 13-14.

**Paulraj, S. (1992b).** Interpretation for Neglected Exhibits: Part - II of Improve your Interpretation Techniques. *Zoos' Print*, 7(9): 13-15.

**Paulraj, S. (1993).** Education - Improve your Interpretative Techniques. Part - III--Interpretative Walk. *Zoos' Print*, 8(11): 32-34.

**Weinberger, M.G. & C.S. Gulas (1992).** The Impact of Humour in Advertising: A Review. *Journal of Advertising*, 21(4): 35-59.

**S. Paulraj**
**Executive Secretary, Chennai Snake Park, Raj Bhavan Post, Guindy, Chennai, Tamil Nadu 600 022. Email: paulrajifs@gmail.com**

# World Otters Day in Coringa Wildlife Sanctuary, Andhra Pradesh


**Introduction by Shri. Anant Shankar, IFS, DFO (WL) Rajamahendravaram & Addl. CEO, UNDP-GEF-EGREE Foundation**

The World Otter Day was celebrated on 30th May 2018 to spread awareness on the conservation importance of Indian Smooth-coated Otters in Godavari Mangroves. The event was organized in Coringa Wildlife Sanctuary, Government of India- Government of Andhra Pradesh-UNDP-GEF- EGREE Foundation in collaboration with Andhra Pradesh Forest Department in association with IUCN/SSC Otter Specialist Group. The main objective was to reach out more people.

In Coringa and adjoining mangroves the population of Smooth-coated Otters were threatened before the interventions of the Government of India-UNDP-GEF-GoAP - EGREE Project on Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in EGREE Region. After the intervention, the population of Otters have gradually increased in the last 5 years.

More than 70 participants including students, researchers, local communities, Eco-development Committee Presidents, NGOs, line departments, corporate people and all the stakeholders in the EGREE Region were participated.

We also promoted no plastic along with eco-friendly approach, distributed awareness materials made of cloth bags, cloth banner etc., Awareness was created on the importance of Wetlands, Indian Smooth-coated Otters, Fishing Cats and their habitats.

Cloth bags were promoted during the event

The programme was started with welcoming address and followed by inaugural speech and special talks on introduction about the sanctuary, mangroves as habitat for otters etc. by the forest department officials and project coordinators.

Then the participants were taken to mangrove walk and explained about the flora, fauna, mangrove and estuarine ecosystem. They were taken for boating in creeks for sighting Smooth-coated otters, their signs and to the camera trap points, which were installed in the field. They were given hands-on training and explained about the use of camera traps in monitoring of Smooth-coated otter. In the afternoon a documentary film on "Wildlife of Coringa Mangroves" was screened at Coringa Biodiversity Centre, Coringi.

Mr. Eswar Narayana, Member, IUCN/SSC Otter Specialist Group, National United Nations Volunteer, Conservation Biologist, UNDP-GEF-EGREE Foundation, Mr. Mannepuri Srikanth, Post Graduate student, Consultant Researcher, Mr. Balaji Kumpatla, Project Scientist, Andhra Pradesh Forest Department, Mr. Giridhar Malla and Ms. Paromita Ray Researchers were the resource persons for this event.

***Submitted by J. Eswar Satya Narayana, Andhra Pradesh. Email: eswar.narayana@undp.org***


Participants of World Otters Day

# ZOO'S PRINT

**Communicating science for conservation**

## ZOO's PRINT Publication Guidelines

We welcome articles from the conservation community of all SAARC countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and other tropical countries if relevant to SAARC countries' problems and potential.

**Type** — Articles of semi-scientific or technical nature. News, notes, announcements of interest to conservation community and personal opinion pieces.

**Feature articles** — articles of a conjectural nature — opinions, theoretical, subjective.

**Case reports:** case studies or notes, short factual reports and descriptions.

**News and announcements** — short items of news or announcements of interest to zoo and wildlife community

**Cartoons, puzzles, crossword and stories**

**Subject matter:** Captive breeding, (wild) animal husbandry and management, wildlife management, field notes, conservation biology, population dynamics, population genetics, conservation education and interpretation, wild animal welfare, conservation of flora, natural history and history of zoos. Articles on rare breeds of domestic animals are also considered.

**Source:** Zoos, breeding facilities, holding facilities, rescue centres, research institutes, wildlife departments, wildlife protected areas, bioparks, conservation centres, botanic gardens, museums, universities, etc. Individuals interested in conservation with information and opinions to share can submit articles ZOOS' PRINT magazine.

**Manuscript requirements**
Articles should by typed into a Word format and emailed to zooreach@zooreach.org. Avoid indents, all caps or any other fancy typesetting. You may send photos, illustrations, tables.

Articles which should contain citations should follow this guideline: a bibliography organized alphabetically and containing all details referred in the following style: surname, initial(s), year, title of the article, name of journal, volume, number, pages.

**Editorial details**
Articles will be edited without consultation unless previously requested by the authors in writing. Authors should inform editors if the article has been published or submitted elsewhere for publication.

## Publication Information

**ZOO's PRINT, ISSN 0973-2543**
Published at: Coimbatore
Owner: Zoo Outreach Organisation, 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti, Coimbatore, Tamil Nadu 641035, India.



ZOOs' PRINT magazine is informal and newsy as opposed to a scientific publication. ZOOS' PRINT magazine sometimes includes semi-scientific and technical articles which are reviewed only for factual errors, not peer-reviewed.

**Address**
Zoo Outreach Organisation
Post Box 5912, 12, Thiruvannamalai Nagar,
Saravanampatti - Kalapatti Road, Saravanampatti,
Coimbatore, Tamil Nadu 641035, India
Phone: +91 9385339862 & 9385339863
E-mail: zooreach@zooreach.org
Website: www.zoosprint.org, www.zooreach.org

ZOOREACH
ZOO OUTREACH ORGANIZATION