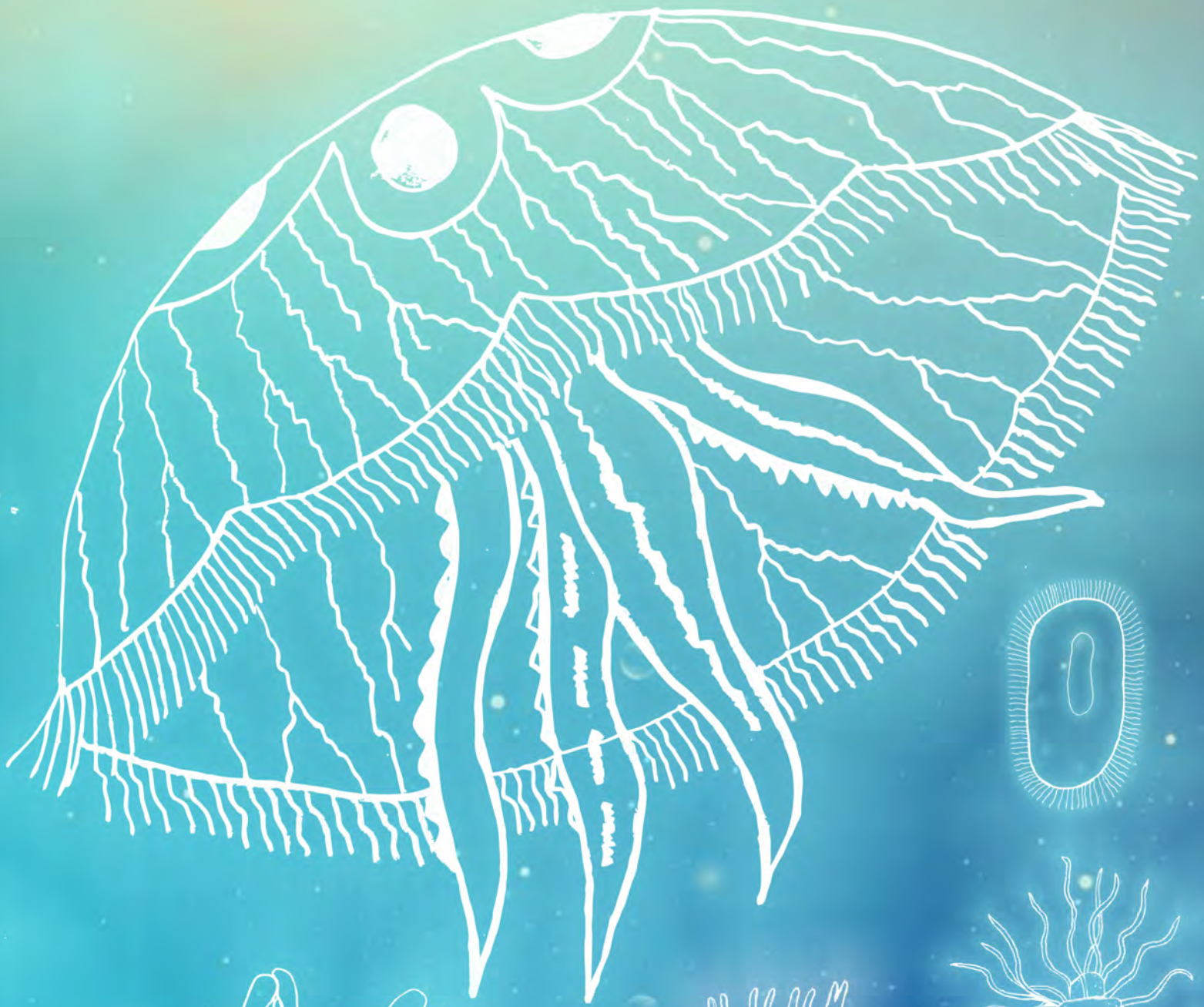
ZOO'S PRINT

Communicating Science for Conservation



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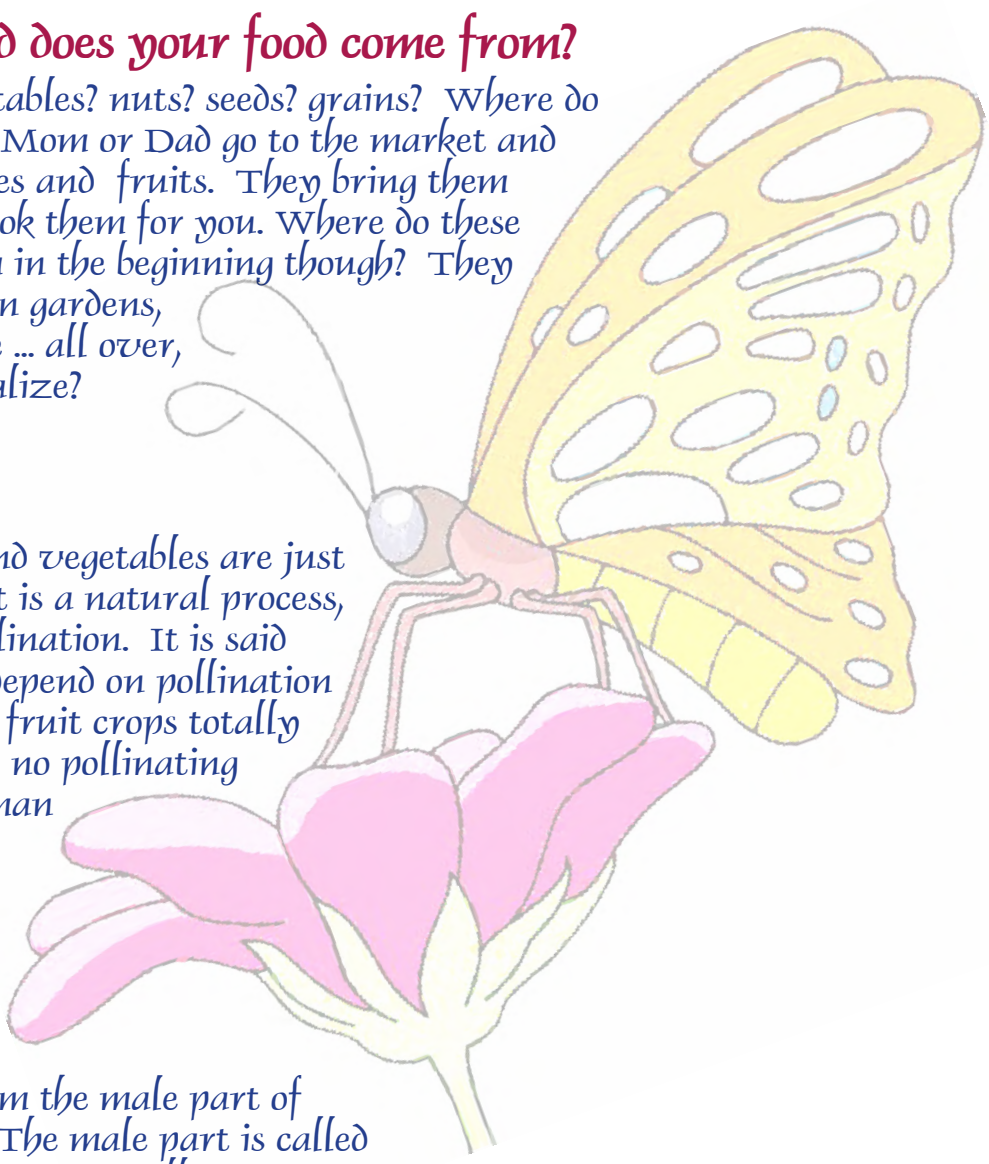
Contents

Pollinators! not just bees!

Pollinators come in all species, sizes, shapes and shades

Where in the world does your food come from?

Do you eat fruits? vegetables? nuts? seeds? grains? Where do you get them? Usually Mom or Dad go to the market and purchase fresh vegetables and fruits. They bring them home, wash them and cook them for you. Where do these healthy foods come from in the beginning though? They come from farms, kitchen gardens, greenhouses, agriculture ... all over, but how do they materialize?



Veggie babies

In a way, these fruits and vegetables are just like babies being born... it is a natural process, for foodstuffs, called Pollination. It is said that 75% of these foods depend on pollination from animals, and some fruit crops totally rely on it. If there were no pollinating animals and plants, human beings would have to go around sifting pollen on plants.

Pollination is sexy

Pollen is transferred from the male part of the plant to the female. The male part is called "anther" and the female part is called "stigma". Like sex is for human beings and animals to have babies, pollination is for plants. It is an essential ecological function. Human beings and the earth's terrestrial ecosystems could not be sustained without sex and pollination.

Secret bond between plants and pollinators

There are two kinds of pollination: one is wind and water-borne and in the other, pollen is carried and spread by animals. The plants and the pollinators have a secret bond -- they are partners. Neither can survive without the other.

Fantastic Facts

Pollination is important

Pollination is so important -- the quality of a plant depends on how well pollinated it is ... it will produce fruits with more seeds and the seeds will have a better ability to germinate and this produces bigger and more beautiful fruits. Human beings also depend on pollination for their well being, through farming. We get our life's energy from the fruits and veggies that come off the farm. In turn these foods require successful pollination for a harvested crop.

Pollinators: what would we do without you!

Animals are our hero pollinators. About 3% of animals in the wild are our pollinator helpers which include both vertebrates (have a backbone) and invertebrates (no backbone). Some animals visit all flowers while others specialize.

Invertebrate pollinators

By estimation, over 40,000 invertebrate species are pollinators in the service of man, animal and plant. The majority of invertebrate pollinators are bees, butterflies, moths, flies, wasps, beetles, and spiders. Later in this booklet more will be told about these interesting insects.

Vertebrate pollinators

As many as 1500 species of vertebrates are pollinators, including birds, mammals such as bats, non-flying mammals like monkeys, rodents, reptiles, and squirrels. Pollinators affect over one third of crop production in the world. They help increase the amount of cropsand also medicines made from plants.

What percentage pollinates what ?

Much of the world's cultivated crops (such as cashews, squash, mangoes, berries) are pollinated by bees, e.g. 73%! Also 19% by flies, 6.5% by bats, 5% by wasps, 5% by beetles, 4% by birds, and 4% by butterflies and moths.

Some major invertebrate pollinators

- Moths ... are nocturnal, e.g., active during twilight or nighttime, seeking nectar from flowers and transferring pollen among flowers. Nocturnal flowers get heavy with large amounts of diluted nectar that attract insects.

Fantastic Facts

Pollinators need a healthy environment for themselves to sustain healthy ecosystems for us all

Thus good pollination services depend on an abundance and diversity of pollinators. Also pollinators need food, shelter, water, etc. for their healthy survival. They are more likely to get these things from the natural environment IF it is not disturbed.Pollinators play an important role in maintaining the balance and biodiversity necessary for a healthy ecosystem. There has been a global decline in biodiversity due to habitat loss, introduced species, pollution, population growth, and the overuse of resources.

The bad news – Pollinator decline

Pollinator declines or disrupted pollination systems have been reported on every continent. Hundreds of pollinator species, primarily vertebrates, are on the verge of extinction.

Potential consequences of pollinator decline

Crop harvest reduction has been reported due to pollinator scarcity combined with other factors. Loss of pollinators from an area is not easily correctable. Better not to lose pollinators.

- Bees ... with 20K species in the world, are efficient pollinators. Honey bees and bumble bees are most commonly seen. If bees are absent in a season, farmers can lose up to 75% of their crop.
- Beetles ... Beetle-pollinated flowers are very fragrant, large, and bowl-shaped. The shape makes it easier for the clumsy-flying beetles to land inside the flower and eat their way through petals.
- Flies ... Flies, with one set of wings, are the first pollinators of early flowering plants. Flies visit flowers for food in the form of nectar, sometimes pollen and to lay eggs.
- Wasps ... Fig wasps are small in size. They have evolved with fig plants which partnership was so successful that now there are over 900 species of fig plants, each with its own species of wasp.
- Butterflies ... Highly perched on long thin legs, butterflies are not efficient pollinators. Unlike bees that can hover while feeding, butterflies need a place to land because they cannot feed while flying.

Things you can do to help pollinators:

- Dispose garbage properly. Some pollinators are lured by sugar- coated food or garbage containing sugars, when they are needed to collect nectar and spread pollen on plants.
- You kids can learn about nature while creating a garden with plants that attract and feed pollinators. You will also get a chance to observe the pollinators that visit the flowers.
- Observe friends/family outdoors to see if they are driving away or killing pollinating insects or mammals. Explain that they are useful to man so they should not harm them.
- Create pollinator habitats. Grow native plants that provide nectar for pollinators.
- Be careful using pesticides. If you MUST use them, follow directions carefully. The way you apply and dispose of a pesticide can make a big difference for pollinators.
- Purchase organic produce, local honey, native plants, local fruits and fibers when possible to reduce environmental impact.

Some Major Vertebrate pollinators

Vertebrates are animals with backbones. Biologists claim 1500 vertebrate species act as pollinators globally. Many of them (82 mammals and 103 birds) are threatened with extinction (IUCN).

Flying mammal pollinators – Bats

Seven species of fruit-eating bats in India are pollinators. Pollen grains left after bats lap nectar transfer to flowers. Flowering for bat-pollinated trees matches bat breeding season providing food.

Non-flying mammal pollinators – Rodents, Shrews, Primates

Many non-flying mammals feed on nectarous flowers. A Diversity of non-flying mammals visit the flowers of trees and shrubs, but their relative roles in effective pollination are not well understood.

Fantastic Facts

- Learn more about pollinators in your area. Join nature loving friends and create small projects in plant-poor localities.
- Share your experience with your friends and neighbours and with Zoo Outreach Organisation so we can share with readers.

List of vertebrate (backbone) pollinators around the world

We generally presume that invertebrates such as bees and beetles are the only pollinators. Actually there are many (~1500) vertebrate species around the world that are pollinators, including India and other South Asian countries.

Some vertebrate pollinators around the world are:

Marsupials: Marsupial Mice -- Found in Australia and New GuineaBats: Flying foxes -- Found in South Asia, Australia, Philippines and many other countriesLemurs: Brown Lemurs -- Found in Madagascar Marmosets: Found in Brazil Monkeys: Tamarins -- Found in ColombiaRodents: Tree Squirrels -- Found in United States of America Birds: Humming birds, United States of AmericaReptiles: Geckos -- Found in New Zealand.

by Sally R Walker, B.A. Daniel and Latha G. Ravikumar

Vertebrate pollinators - Birds

Bird pollination is more common than bat pollination in nearly 500 genera of plants. Pollination by both birds and bats total to about 3–11% of all flowering plants. In India 58 bird species pollinate 93 flowering plants.

Vertebrate pollinators - Reptiles

Reptiles are generally known as seed dispersers. Their role as pollinators is controversial since they consume reproductive parts of plants. Only a few reptiles have plant materials in their diet.

Human pollinators

In some countries bee keepers move their colonies (commercial pollinators) into the into the area that needs pollinating. Honey bees are used often because they form large but easy to transport colonies.

Nature is Best

Commercial pollinators spread disease resulting in the decline of wild pollinators. Disease-carrying commercial pollinators escape from greenhouses and interact with wild bees at flowers.

Print this mask on a card and cut it

Hawk Moth

Collect these masks for exciting games

PALM SQUIRREL

A status update of *Funambulus palmarum* in Gujarat, India

Three-striped palm squirrel near Manchi Haveli, Pavagadh Hill, Panchmahal District, Gujarat (22°28'3"N & 73°31'26"E; 436m) (Photo: Rahul D. Bhatt

IUCN Red List: Least Concern
(Nameer & Molur 2016)

Mammalia
Class of Mammals

Rodentia
Order of rodents or gnawing animals

Sciuridae
Family of tree squirrels

Funambulus palmarum
[Three-striped Palm Squirrel]

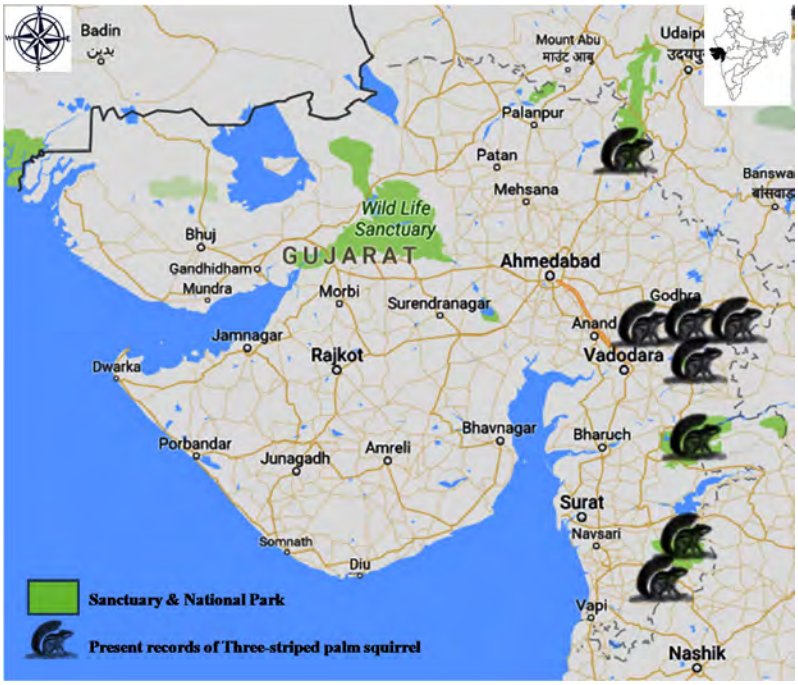
Species described by Linnaeus in 1766

Three-striped Palm Squirrel *Funambulus palmarum* (Linnaeus, 1766), is endemic to South Asia (Molur et al. 2005) and listed as Least Concern in the IUCN Red List (Nameer & Molur 2016). Several niches occupied by *F. palmarum* are often shared with the Northern Palm Squirrel *Funambulus pennantii* (Wroughton, 1905). Literature, photographs as well as visual clues indicate that *F. palmarum* is larger in size (Head-Body Length (HLB): 188-189mm) with rounded ears, blunt muzzle, brownish-grey dorsum and yellowish-white colored stripes. The two additional dorsal stripes separating belly and flanks present in *F. pennantii*. Tail of both the species is bushy but *F. palmarum* has a characteristic reddish

line underside of the tail down the centre (Baqri 2000; Datta & Nandini 2013, 2014).

Presence of *F. palmarum* has been reported from many Indian states, viz., Andhra Pradesh, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Orissa and Tamil Nadu (Molur et al. 2005). In Gujarat, sightings of *F. palmarum* are documented from Vansda National Park (Singh et al. 2000), Jambughoda Wildlife Sanctuary (Padate et al. 2003) and Polo Forest (Sharma 2005). On the other hand, reports from Purna Wildlife Sanctuary (Pandey et al. 2004a), Shoolpaneshwar Wildlife Sanctuary (Pandey & Raval 2010), Jessore Wildlife Sanctuary (Pandey et al. 2004b) and Wild Ass Sanctuary, Little Rann of Kutch (Singh et al. 1999) are tentative and need further confirmation. Online reports and pictorial evidences provide information on presence of *F. palmarum* in areas of Bharuch (Baqri 2000), Sutrapada (Anon 2006) and Vapi (Anon 2010). Though, several biodiversity surveys, research papers and online reports have mentioned about occurrence of *F. palmarum* in various parts of Gujarat, the same needs verification (Singh 2013). Hence, the present study was carried out to confirm and validate the occurrence of *F. palmarum* in northern, central and southern districts of Gujarat state.

Global Distribution: Endemic to southern India and Sri Lanka (Molur et al. 2005, Thorington & Hoffmann 2005)



Map of Gujarat (Source: Google Maps) depicting sightings of Three-striped Palm Squirrel

Visual survey method as per Gurnell et al. (2009) with minor modifications was employed in this study to confirm presence of *F. palmarum* in known habitats. New locations comprising of scrub lands and forested patches of Gujarat were also explored for presence of *F. palmarum*. In each potential habitat, six survey lines of 500 m were walked during early morning (07.00 to 09.30 hrs) and dusk (04.30 to 07.00 hrs) in all the seasons for consecutive three years i.e., from 2014 to 2016. Such surveys were carried out 2–4 times within a 2-weeks period in each potential habitat by taking into account variations in weather conditions and squirrel activity. Occurrence of *F. palmarum* was monitored

Table: Sightings of Three-striped palm squirrel in Gujarat during 2014-2016

	Name of Locality	Lat-Long	District	Local status of animal based on present study	Reference(s)
1.	Vansda NP	20°45'49"N & 73°29'9"E; 129m	Navsari	C	Singh et al. 2000, Present study
2.	Purna WLS	20°56'36"N & 73°43'27"E; 473m	Dang	C	Pandey et al. 2004, Present study
3.	Shoolpaneshwar WLS	21°45'38"N & 73°47'41"E; 431m	Narmada	C	Panday & Raval 2010, Present study
4.	Ratanmahal WLS	22°34'35"N & 74°6'50"E; 269m	Dahod	C	Present study
5.	Kevdi EC	22°31'12"N & 73°56'7"E; 194m	Dahod	UC	Present study
6.	Jambughoda WLS	22°21'39"N & 73°39'55"E; 244m	Panchmahal	C	Padate et al. 2003, Present study
7.	Pavagadh Hill	22°27'43"N & 73°31'26"E; 390m	Panchmahal	A	Present study
8.	Areas surrounding Tadiya Lake	22°21'52"N & 73°34'32"E; 85m	Panchmahal	UC	Sharma 2005, Present study
9.	Polo Forest	23°59'56"N & 73°16'45"E; 306m	Sabarkantha	C	Present study

*** A–Abundant; C–Common; EC–Eco Campsite; UC–Un Common; NP–National Park; WLS–Wildlife Sanctuary**

by exploring the surrounding area of survey line at each 50 m intervals and time, place, number of individuals and the micro-habitat features were noted.

F. palmarum is known to prefer forested areas with dense valleys and foothills in contrast to *F. pennantii* prefers open forests, agricultural fields and close proximity to human habitations (Sharma 2005). In spite of the differences in habitat preference of *F. palmarum* and *F. pennantii*, their distribution range overlaps suggesting that they often share a common niche (Molur et al. 2005). Reports of doubtful sightings or wrong identification may result due to overlapping ranges of *F. palmarum* and *F. pennantii*. Therefore, direct visual evidences are highly valuable to confirm their past distribution records.

In the present study, a healthy population of *F. palmarum* observed in Vansda National Park, Jambughoda Wildlife Sanctuary and Polo Forest, which provide clarity on their distribution and its documentation as a 'locally common species' (Singh et al. 2000; Padate et al. 2003; Sharma 2005) could be justified. Similarly, our study also confirmed presence of *F. palmarum* in Purna and Shoolpaneshwar Wildlife Sanctuaries that was previously reported as 'tentative' by other workers (Pandey et al. 2004a; Pandey & Raval 2010). During our study, presence of *F. palmarum* was also recorded from four new

geographical areas in Gujarat viz., Ratanmahal Wildlife Sanctuary, Kevdi eco campsite, Pavagadh hill and areas surrounding Tadiya Lake that lie within the Panchmahal district of Gujarat. Habitat in these areas comprise of undulating terrain, hills, dry deciduous forest with patches of scrub land and semi-arid landscapes and are comparable to Jambughoda Wildlife Sanctuary. Maximum sightings of *F. palmarum* (28 individuals in a single 500 m survey line) was recorded at Pavagadh hill. A healthy population of *F. palmarum* at Pavagadh hill (a busy tourist place) is attributable to availability of anthropogenic food stuff.

Three-striped palm squirrel observed at Mithibor village near Ratanmahal Wildlife Sanctuary, Dahod District, Gujarat (22°32'24"N & 74°0'2"E; 237m) (Photo: Kartik Upadhyay)

Hence, it can be concluded from our study that *F. palmarum* occupies much broader range of habitats in northern, central and southern parts of Gujarat (Table). Saurashtra and Kutch regions of Gujarat were not covered in this study and the same need to be done to establish distribution limits of *F. palmarum* in Gujarat state.

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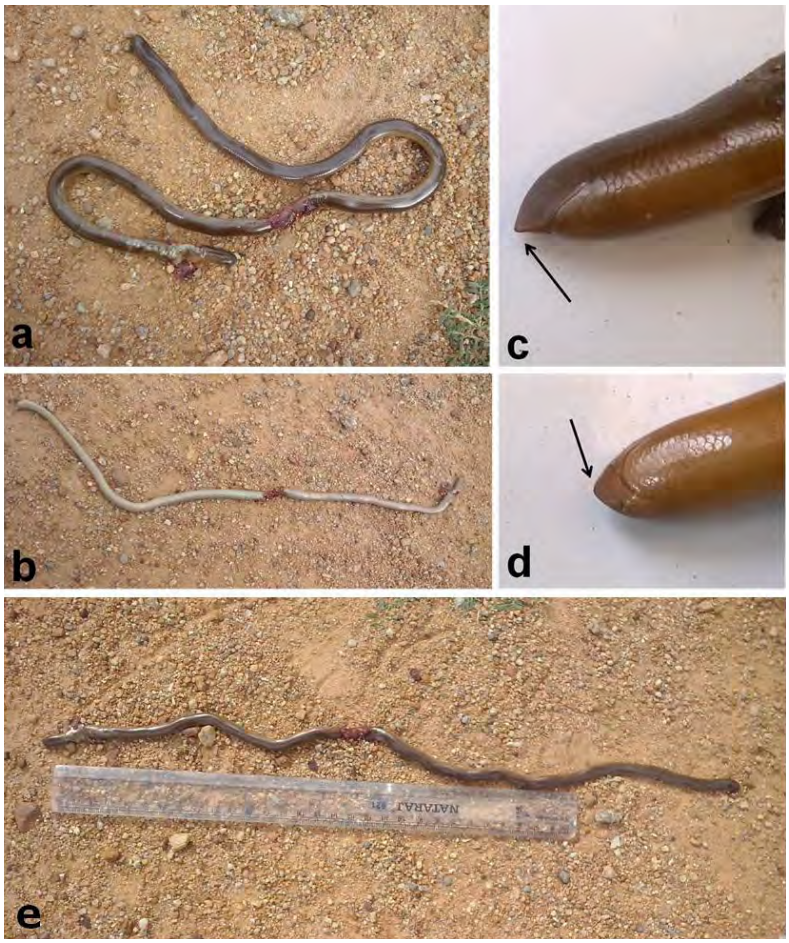
BEAKED WORM SNAKE

Record of *Grypotyphlops acutus* at Prof. Jayashankar Telangana State Agricultural University, Hyderabad, Telangana



IUCN Red List:
Least Concern
(Srinivasulu et al. 2013)

***Grypotyphlops acutus*: (a) & (b) - Showing dorsal, ventral side of a dead sname (road kill), (c) & (d) - Lateral, ventral side showing the pointed hook like anterior end, (e) - TBL 42 cm (Scale = 30 cm)**

Reptilia
[Class of Reptiles]

Squamata
[Order of Scaled reptiles]

Typhlopidae
[Family of Blind snake]

Grypotyphlops acutus
[Beaked Worm Snake]

Species described by
Duméril & Bibron in 1844

Beaked Worm Snake *Grypotyphlops acutus* (Bibron & Duméril & Bibron 1844) of the family Typhlopidae is endemic to peninsular India. This species has been listed as Least Concern in IUCN Red List (Srinivasulu et al. 2013). In 1928 D'Abreu had collected three specimens at Nagpur. Hence, distribution of the species was known from South of Ganges Basin and South of Rajputana (Rajasthan), West of Baroda and East to Calcutta (Smith 1943). Later on this species reported from Andhra Pradesh, Tamil Nadu, Kerala, Madhya Pradesh, Maharashtra, West Bengal,

Bihar, Odisha (Murthy 1995). Literature evidence shows that records of this snake from the state of Gujarat (Daniel & Shull 1963; Sharma 1982; Gayen 1999) and reported length record of this species (Vyas et al. 2001). Nande et al. (2007) also recorded from Amaravati, Melghat, Maharashtra. An albino *G. acutus* for the first time reported from Dapoli, Maharashta (Nivalkar et al. 2012). Apart from that little studies available on the taxon ecology. On recently Pyron & Wallach (2014) studied systematics of the blind snakes based morphology and molecular evidences.

After Murthy (1995) there were no record of this species from erstwhile Andhra Pradesh (Telangana was part of Andhra Pradesh). At present we were reporting for the first time from Telangana State. On 10 June 2013, we saw a dead snake (road kill) on the road near All India Network Project on Vertebrate Pest Management office, Prof. Jayashankar Telangana State Agricultural University (PJTS), Rajenderanagar, Hyderabad 17.32613 N and 78.41009 E at 16.05hrs. After keen observation, it was identified as Beaked Worm Snake *G. acutus*. The size of the specimen measured with a scale, SVL= 37 cm, TL=5 cm and TBL= 42 cm. Digital image voucher, have catalogued the picture at Lee Kong Chian Museum of Natural History at the National University of Singapore as ZRC [IMG] 2.382.

Global Distribution:
India (Andhra Pradesh, Bihar, Chattisgarh, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal)

PJTS Agricultural University campus consisting of varied habitat types of open scrub, rocky outcrops, mixed forests, wetlands and agricultural landscapes. It is located 20km away from the Hyderabad city. Land utilization pattern of the area includes agricultural land (30.46%) followed by natural forests (26.10%), water bodies/ tanks (24.70%) and urban built up area (19.33%) (Swamy et al. 2015). These habitats are well attracted to variety of herpetofauna. Only one sympatric species found namely Brahminy Worm Snake *Ramphotyphlops braminus*. A total of 57 other herpetofauanal species were recorded in the area (Swamy et al. 2015). The common snake species are found in the PJTS Agricultural University environs namely Indian Cobra *Naja naja,* Common Krait *Bungarus caeruleus,* Common Kukri Snake *Oligodon arnensis,* Checkered Keelback *Xenochrophis piscator,* Oriental Rat Snake *Ptyas mucosus* and Russell's viper *Daboia resselli*.

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KING COBRA

Occurrence of *Ophiophagus hannah* in Papikonda National Park, Eastern Ghats, Andhra Pradesh

King Cobra *Ophophagus hannah* killed by Kothuru and Konthangi villagers of East Godavari, Andhra Pradesh, India on 22 August 2014

IUCN Red List: Vulnerable (Stuart et al. 2016)

Reptilia
[Class of Reptiles]

Squamata
[Order of Scaled reptiles]

Elapidae
[Family of Venomous snake]

Ophiophagus hannah
[King Cobra]

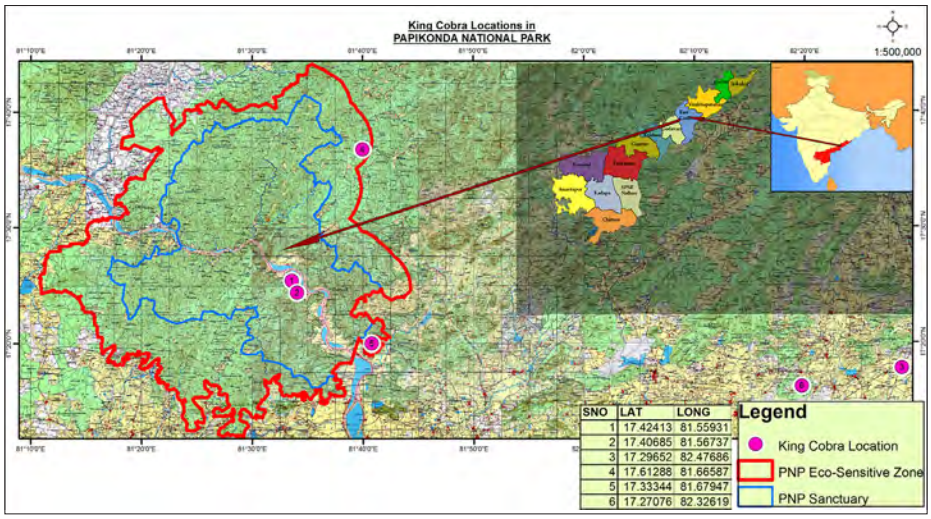
Species described by Cantor in 1864

King Cobra *Ophiophagus hannah,* one of the world's largest venomous snake widely distributed in South and Southeast Asia, from Nepal, India, Bangladesh, Bhutan, Myanmar (David & Vogel 1996; Selich & Kestle 2002; Stuart et al. 2016).

The King Cobra is listed under Schedule II of the Indian Wildlife (Protection) Act, 1972; Appendix II of CITES; and placed in the category Vulnerable by IUCN Red List of Threatened Species (Stuart et al. 2016).

The King Cobra distribution in India was reported from Western Ghats, Shiwalik and terai regions of Uttarakhand and Uttar Pradesh, Bihar, Orissa, West Bengal, north-eastern India and the Andaman Islands (Das 2002; Whittaker & Captain 2004; Ahmed et al. 2009). In the Western Ghats it is known to occur

in the states covering Tamil Nadu, Kerala, Karnataka and Goa (Smith, 1943; Whitaker & Captain 2008; Bashir et al., 2010; Bhaisare et al., 2010; Sangha et al., 2011). In Andhra Pradesh, King Cobra was reported from northern coastal areas, in the districts of Srikakulam, Vizianagaram and Visakhapatnam (Murthy & Murthy 2012). This species has been reported to occur in humid jungles with thick undergrowth, cool swamps and bamboo clusters (David & Vogel 1996; Selich & Kestle 2002; Leviton et al. 2003; Anon 2005; Das et al. 2008).



Demarcation of Kind Cobra locations in and around Papikonda National Park

Global Distribution:
South and Southeast Asia from Nepal, India, Bangladesh, Bhutan, Myanmar (David & Vogel 1996; Selich & Kestle 2002; Stuart et al. 2016)

Faunal survey was conducted in the Papikonda National Park and its adjacent reserve forest. Sign surveys and Camera trapping was followed to know the presence of wildlife.

In this study species identification was done based on photographs in camera traps, specimens and skin moult.

During the survey, at one occasion King Cobra was recorded through camera trapping (Cuddeback attack model infra-red camera traps) on 17 February 2016, the

Camera trap picture of King Cobra *Ophophagus hannah* inside the Papikonda National Park, East Godavari, Andhra Pradesh, India on 17 February 2016

Table: Current records of King Cobra *Ophiophagus hannah* in Papikonda National Park and adjacent reserve forest, Eastern Ghats, Andhra Pradesh, India

	Date	Locality (Area Name)	Coordinates	Time	Record	Alt. (m)	Forest type
1.	17.2.2016	Inside Park boundary	17.42413^{0}N & 81.55931^{0}E	04.11PM	Camera trapped	520m	Moist Deciduous Forest
2.	22.7.2016	Inside Park boundary	17.40685^{0}N & 81.56737^{0}E	-	Moult	520m	Moist Deciduous Forest
3.	14.3.2017	Outside the Protected area	17.29652^{0}N & 82.47686^{0}E	-	Killed by the villagers	238m	Moist Deciduous Forest
4.	13.8. 2016	Inside the Ecosensitive Zone (Satlavada Reserve Forest)	17.61288^{0}N & 81.66587^{0}E	02.05PM	Direct Sighting	532m	Moist Deciduous
5.	18.2.2016	Inside the Ecosensitive Zone (Satlavada Reserve Forest)	17.33344^{0}N 81.67947^{0}E	-	Moult	260m	Moist Deciduous Forest
6.	06.9.2016	Outside the Protected area	17.27076^{0}N 82.32619^{0}E	-	Killed by the villagers	154m	Moist Deciduous

location and altitudes were recorded using a Garmin etrex 10 GPS receiver (Table). Two King Cobras 13.5 ft female 13.8ft male were killed by the Kothuru and Konthangi villages of East Godavari district which is about 86 and 70 kms. respectively from the park boundary and these two specimens were preserved in the Biodiversity Laboratory maintained by Andhra Pradesh forest department stationed at Rajamahendravaram. Two moults at different locations were also observed during the study period. The area where the camera trapped and sightings were moderately dense forest which included the bamboo patches and also a stream flows seasonally nearby. The altitude was recorded to be 532m. There were some unconfirmed reports from western region of the Papikonda National Park which needs detailed study.

The forest types of the Papikonda National Park and Satlavada Reserve Forest come under the southern dry mixed deciduous forests (5A/C3) and the southern moist mixed deciduous forests (3B/C2) (Champion & Seth 1968).

Since there were no records from this region, these are the first evidences reported on extension of King Cobra distributional range in Papikonda National Park and its adjacent reserve forests in Eastern Ghats, Andhra Pradesh. As the present record confirms the presence of isolated populations of King Cobra and also the records of human animal conflict, there is a need to carry out awareness programmes in the adjacent villages and also to conduct baseline study by the park managers and researchers on the conservation status in this region.

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BURMESE PYTHON

New sighting record of *Python bivittatus* in Sumera Block, Jawan, Aligarh, Uttar Pradesh, India

Burmese Python resting on ground under the shade of Bistendu

IUCN Red List: Vulnerable (Stuart et al. 2012)

Reptilia
[Class of Reptiles]

Squamata
[Order of scaled reptiles]

Pythonidae
[Family of Python]

Python bivittatus
[Burmese Python]

Species described by Kuhl in 1820

Pythons include some of the world's largest and spectacular snakes that comprise of an enormous diversity of morphology, behaviour and ecology (Reynolds et. al. 2014). The Indian subcontinent is a home to three species of pythons which are the Indian Rock Python (*Python molurus,* Linnaeus, 1758) the Burmese Python (*Python bivittatus,* Kuhl, 1820) and the Reticulated Python (*Python reticulatus,* Schneider, 1801). The Burmese Python and Indian Rock Python are two distinct species (Jacobs et. al. 2009; Reynolds et. al. 2014; Barker et. al. 2015).

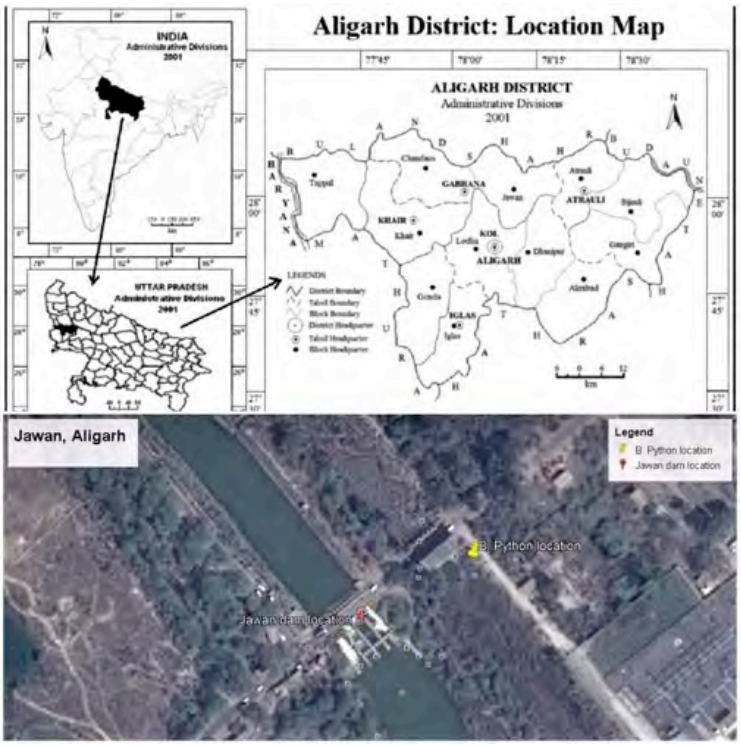
A prominent difference is the presence or absence of a sub ocular scale (Joshi R. and Singh A. (2015)). Indian Rock Python is distinguished with sixth/seventh labium touching the eye, having unclear lance-shaped mark on the top of the head and pink tongue in adults. While in Burmese Python, the labia are separated from the eye by sub-oculars (O'Shea 1998; Smith 1943;

Daniel 2002; Whitaker & Captain 2004).

Burmese Python is a nocturnal species, but sometimes can be seen during daytime while basking, resting or foraging on preys. Its activity is usually terrestrial and semi-aquatic in nature, carried out with slow locomotion. Burmese Pythons grow up to 3.7 metres on average, rarely grow up to 4 metres. It is usually non-offensive in behaviour and the species tends to escape in natural surroundings to avoid conflict with humans and other large predators. It feeds on a wide range of animals including rodents, bats, mammals, reptiles and birds.

Global Distribution:
Throughout the Southeast Asia including eastern India, Nepal, parts of Bhutan, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam, northern Malaysia and Southern China (Barker & Barker 2008, 2010)

Burmese pythons are found throughout the Southeast Asia, including eastern India, Nepal, parts of Bhutan, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam, northern Malaysia and Southern China (Barker & Barker 2008 2010).



Map of Jawan, where Burmese Python was sighted; Source: Google earth and www.researchgate.net/profile/Shamshad2

On 18 May, 2017, while collecting the data for my M.Sc. Dissertation on Rhesus macaques (*Macaca mulatta*) at 10.15hrs, I observed some of the Rhesus macaques become highly disturbed and they were yowling in an unusual manner. I tried to figure out the reason for their panic and observed their awareness about some possible danger lurking inside the bushes of Bistendu (*Diospyros montana*) and Babool (*Acacia nilotica*) along the marshy land of Canna grass *(Saccharum benghalense*). The area is dominated by Canna grass and stagnant water and is situated in the rear vicinity of Bijaligarh (28^{0}02'26.4"N & 78^{0}06'51.9"E), Sumera Block, Jawan, Aligarh.

I presumed the cause to be a snake and decided to find it out. My deduction proved to be right when, upon approaching the bushes, I noticed a huge Python resting on the ground under the shades of Bistendu (*Diospyros montana*) and other plants in the surrounding. When the Python sensed my presence, it moved downwards into a grassy area through the bushes. After sometime of trivial inactivity, it moved back to its original location where it was found resting. I captured some spectacular images of the

Table: Recent Sightings of Burmese Python

	Place	Co-ordinates	Date of Sighting
1.	Rajaji National Park	29°53'50.5"N & 78°16'47.8"E	Mar 31, 2007
2.	Hastinapur Range	29°04'51.40"N & 78°03'46.10"E	Nov 14, 2009
3.	Forest Rest House, Hastinapur Range	29°09'16.73"N & 77°59'58.44"E	Dec 28, 2009
4.	Rispna River, Jakhan	30°21'57.7"N & 78°04'38.7"E	Sep 15, 2010
5.	Timli Forest Range, Kalsa Forest Division	30°20'N; 77°40' E & 30°25'N	Oct 14, 2011
6.	Lacchiwala Forest Range	30°15'19.1"N & 78°01'55.8"E	Nov 08, 2011

Python with my android device.The estimated length of the python was approximately 3m. Age-sex could not be identified as it escaped from the sighting before close physical examination. From my initial observations and descriptions, I concluded it to be a Burmese Python. My further attempts to examine it were met with failure as it got disturbed and started moving under the bushes into the inaccessible Canna grass again. I tried to grab its tail and pull back to an open space to study some more data about its physical aspects but it was too heavy for me.

Burmese Python

This area is located in the vicinity of the Ganges where 'Jawan dam' is situated in Sikandarpur, Aligarh.

The next day, I attempted to relocate the Python in the morning but could not locate it even after several hours of extensive search. In the adjoining area, there is a Sumera Block Electricity staff office, where some of the workers informed me about the appearance of the python. Although the python is living in this area for quite some time as reported by the locals, it might be a natural distribution or an escapee from the snake charmers. Even the possibilities are that it might have floated down from Rajaji National Park or from Hastinapur area along the Upper Ganga Canal which originates from Haridwar (Uttarakhand), and passes nearby area where I initially sighted the python.

Most of the sightings of the Burmese Python occurred during the Summer-Monsoon Season near natural water sources, in grasslands and in the riparian corridors of the Ganges (Joshi & Singh 2015). Recent studies have

also revealed that the Upper-Gangetic plains provide a suitable habitat for pythons in the tropical moist deciduous forest of north-western India along with Ganges. The networks of seasonal rivers of Ganges also contribute to the survival and dispersal of the python species (Joshi and Singh, 2015); which confirms that the range and distribution of Burmese Python is changing as new sightings were recorded from different areas.

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Diversity and status of avifauna in Doddabetta hills and surrounding areas of Udhagamandalam, Nilgiris Plateau, Western Ghats, Southern India

Avifaunal diversity is one of the most important biotic components for any type of ecosystem (Dhindsa & Saini 1994). Birds are found from pole to equator almost everywhere in the world and exhibit great diversity by their habitat and geographical conditions. In temperate and tropical forests, bird communities are well studied (Wilson & Comet 1996; Blake 2007). Avian fauna acts as an important bio-indicator (Bilgrami 1995; Centrrbury et al. 2000; Mistry 2008; Slabbekoorn & Ripmeester 2008) that assesses different habitats qualitatively as well as quantitatively. Birdlife recorded worldwide over 10,000 different species of birds. Rapoport (1993), Chen et al. (2011) and Sekercioglu et al. (2012) documented that worldwide decline of avian fauna is due to anthropogenic activities and climatic changes. According to Roy et al. (2012) bird population has declined only because of change in land use patterns. Huges et al. (1997) have reported around sixteen million birds being destroyed annually. India stands at 7th position with 88 threatened bird species over the world (BirdLife International 2010). Generally, organisms do not respond directly to the elevational gradient as such, but to variables correlated with the gradient such as climate or productivity (Terborgh 1977). In addition factors operating at multiple spatial and temporal scales may also influence species diversity. For example local climate, ecotones, competition, habitat structure and heterogeneity play a prominent role in determining species diversity at local level (Terborgh 1977, 1985; Ricklefs & Schluter 1993; Huston 1999; Lomolino 2001). As elevation increases, the availability of resources for birds diminishes reflecting differences in forest stand structure, site productivity, vegetation composition, distribution pattern, secondary biotic interactions and available land area (Able & Noon 1976; McCoy 1990; Rahbek 1995; Sabo 1980; Hofer et al. 1999; Waterhouse et al. 2002). In fact avian community composition and diversity along elevation gradient has not received enough attention in India. Our purpose study is to explore the avifaunal diversity in and around areas of Doddabetta hills of the Upper Nilgiris, Western Ghats.

Review of Literature

Bird community investigations in the higher elevations of the Nilgiris were scarce.

Davison (1883) provided perhaps the earliest and the most comprehensive account of the birds of the Nilgiris, mainly based on his personal observations and bird collections. Cardew (1885) provided observations on some species unrecorded or left doubtful by Davison (1883). Baker & Inglis (1930) provided natural history observations on several Nilgiri birds. Betts (1931) recorded the behaviour and status of bulbuls of the Nilgiris and other birds. Ali (1977) highlighted the affinities of the Nilgiri and Himalayan fauna, including the laughing thrushes. Ornithological exploration in the recent decades focused either on a single species or bird group. For example, Khan (1979) worked on the ecology of the Black-and-Orange Flycatcher *Ficedula nigrorufa*. Islam (1985) investigated the ecology and behavior of the Nilgiri Laughingthrush *Garrulax cachinnans*. Nair (1995) studied the birds in the Nilgiris. Gokula & Vijayan (1996) reported birds of Mudumalai Wildlife Sanctuary. Gokula (1998) studied the bird communities of the thorn and dry deciduous forests of Mudumalai Wildlife Sanctuary in the lower elevations of the Nilgiris. Thirumurthi and Balaji (1999) surveyed raptors in Nilgiris while Vijayan et al. (2000) conducted a preliminary status survey of the Nilgiri Laughingthrush. Zarri et al. (2005) conducted the first intensive ecological investigation on the avifauna of the Nilgiris and reported the patterns of bird community, guild structure and their habitat utilization. Peter et al. (2015) investigated that study on avifaunal diversity and species richness in foothills of Nilgiris. Manikandan & Balasubramanian (2016) studied the bird diversity of a riparian forest (Bhavani River) in the Nilgiri Biosphere Reserve. On this regard the present study is a first attempt to explore the diversity and status of the avifauna in Dodabetta hills in and around area of the Upper Nilgiris region.

Study area

Nilgiris District, which is located in Tamilnadu state. It is elongated in the east - west direction and bounded by $11^0$30'–$11^0$15'N and $76^0$45'–$77^0$00'E. The district is bounded by the states on the west by Kerala, on the north by Karnataka and on the southeast and south by Coimbatore District of Tamilnadu. The total area extent of the district is around 2,551km^2 and is one of the smallest districts in the state. The Nilgiris can be divided into two natural regions: (a) Upper Nilgiris plateau, extending 56km from east to west, 20km from north to south, deeply indented, with an average elevation of 1980m; (b) southeast Wynaad 900m, covered with bamboo forests, and paddy flats (Hockings 1989). Of the numerous stream and rivulets in the study area, most drain into the two principal rivers of the Nilgiris: the Bhavani and the Moyar. Average annual rainfall of the district is 1,920mm.

Since this district is situated at an elevation of 900–2,636 m during summer the climate remains to the maximum of 21–25 ^{0}C and the minimum of 10–12 ^{0}C. During the winter the temperature available to the maximum 16–21 ^{0}C and minimum of 2^{0}C.

Doddabetta hill is the highest mountain in the Nilgiri hill ranges at a height of 2,623m (8,652 ft) in the Nilgiris District of Tamil Nadu. Doddabetta peak along with nearby reserved forest area and hill station of Ooty is the popular tourist attraction of Tamil Nadu. In the Nilgiris plateau Doddabetta is highest peak of the Nilgiris district remarkable for the flattened curve of its summit. Thick woods decorate the hollows of its slopes. Slightly stunted, rhododendron trees, in the midst of thick coarse grass, flowering sub-alpine shrubs and herbs are common sight even very near to the peak. The present study to monitoring the avian status and diversity of avian fauna in the Doddabetta hills containing the different kind of vegetation structure viz., Southern Mountain Wet Temperate Forest hence called as Shola forest, Plantation (Eucalyptus, Wattle), Manmade Ecosystem (Botanical Garden), Agricultural and Human Habitation.

Methods

The study was carried out between June 2013 and May 2016. The line transect method was used, as the habitat of the study area were shola forest, plantations (eucalyptus, wattle, agriculture) and human habitation (Champion & Seth 1968). A total of 25 transects were laid that covered most of the study area. Transect length remained constant (1,000m), but the width varied according to survey area and visibility: in forests, 15m; in agricultural fields, 20m; and in other open fields, 50m. The field surveys were conducted in the morning (between 06.00hr and 10.00hr) and in the evening (from 16.00hr to 19.00hr), when birds were found to be most active. Birds were observed using the Olympus binocular (10X58 DPSI, USA), and photographs were taken with a Cannon EOS D 1200 camera for further identification. Birds were identified by Ali & Ripley (2007) and Grimmett et al. (2011). The data recorded in each survey were kept separate, and later analyzed for relative abundance on the basis of the frequency of sightings, as per MacKinnon and Phillipps (1993): very common (VC) sighted >10 times; common (C) sighted from seven to nine times; uncommon (UC) sighted from three to six times; rare (Ra) sighted once or twice. The residential status of the birds was worked out, and different status categories were used; resident and winter visitor were assigned strictly with reference to the study area on the basis of the presence or absence method (Zarri et al, 2005). Moreover, guild analysis was done based on Joshi (2012). The birds were

grouped into 23 feeding guilds (Table 2). The IUCN Red List categories was also used to compare the local status with the global status as well as population trend was also noted (decreasing, stable, increasing and unknown). Birds' nomenclature was based on Grimmett et al. (2011). During the surveys, other information or threats to birds' conservation were also noted. Bird species richness was estimated by recording the number of bird species observed. The encounter rate was considered as relative abundance and calculated as the number of bird species observed/ distance traveled (km). The relative diversity (RDi) of families was calculated using the following formula (Torre-Cuadros et al. 2007).

$$RDi = \frac{\text{Number of bird species in a family}}{\text{Total number of species}} \times 100$$

Results

The study revealed that a total of 123 species of birds belonging to 36 families and 16 orders were present in the study area (Table 1). Passerine birds are dominated the diversity with 71 species compared to non passerine birds (52 species) (Table 2). The present investigation also revealed that the Muscicapidae family (20 species) dominated the avifauna in this area, followed by Accipitridae (12 species) Turdidae (9 species) Sturnidae (8 species) Phasianidae (5 species) and Columbidae, Motacillidae, Nectariniidae, Ploceidae, Parulidae Ploceidae and Pycnonotidae (4 species each). Moreover, 15 families Apodidae, Caprimulgidae, Ciconiidae, Charadriidae, Dicruridae, Estrildidae, Falconidae, Meropidae, Monarchidae, Pandionidae, Phalacrocoracidae, Rallidae, Sittidae, Upupidae, Zosteropidae were poorly represented in the study area with a single species each (Table 2). The highest RDi value was also recorded for Muscicapidae family (16.26%) and also considerable amount of RDi values were recorded for Accipitridae (11.38%) Turdidae (7.32%) Sturnidae (6.50%) Phasianidae and Hirundinidae (4.07%) respectively (Table 2).

The analysis of data on residential status revealed that out of 123 species, 95 were resident, whereas the remaining 28 Species were winter visitors. The residential status of birds also showed differences in their relative abundance. Further analysis of relative abundance indicated that 22 species were VC (very common), 31 species were C (common), and 36 species were UC (uncommon) and 34 species were Ra (rare). The encounter rate of the species was 8.82 during the surveys.

Feeding guild analysis of the birds species shows that Aerial Insectivore (AI) Grass land insectivore (GLI) (11%), under-storey insectivore (USI) (11%) and arboreal terrestrial

Table 1. Systematic list and status of Birds in Doddabetta Hills, Nilgiri Plateau, Tamil Nadu, India

	Family	Species name	Common English name	IUCN status	IUCN population trend	Residential status	Relative abundance	Feeding guild
1	Accipitridae	*Accipiter virgatus*	Bersa Sparrow Hawk	LC	DC	R	Ra	SC
2		*Ictinaetus malayensis*	Black Eagle	LC	DC	R	Ra	SC
3		*Milvus migrans*	Black Kite	LC	UN	R	C	ATC
4		*Elanus caeruleus*	Black-winged Kite	LC	ST	R	UC	SC
5		*Haliastur indus*	Brahminy Kite	LC	DC	R	UC	ATC
6		*Accipiter trivirgatus*	Crested Goshawk	LC	DC	R	Ra	SC
7		*Spilornis cheela*	Crested Serpent Eagle	LC	ST	R	Ra	SC
8		*Nisaetus cirrhatus*	Crested Hawk Eagle	LC	DC	R	Ra	SC
9		*Buteo buteo*	Common Buzzard	LC	ST	M	Ra	ATC
10		*Lophotriorchis kienerii*	Rufous Bellied Eagle	LC	DC	M	Ra	SC
11		*Accipiter badius*	Shikra	LC	ST	R	Ra	SC
12		*Circaetus gallicus*	Short-toed Snake Eagle	LC	ST	M	Ra	SC
13		*Pernis ptilorhyncus*	*Oriental Honey Buzzard*	LC	ST	R	Ra	ATC
14		*Butastur teesa*	*White-eye Buzzard*	LC	ST	M	Ra	ATC
15	Alcedinidae	*Alcedo atthis*	Small Kingfisher	LC	UN	R	C	WC
16		*Halcyon smyrnensis*	White-throated Kingfisher	LC	IN	R	C	WC
17		*Ceryle rudis*	Pied Kingfisher	LC	UN	R	UC	AC
18	Anatidae	*Anas crecca*	Common Teal	LC	UN	M	Ra	AIGSE
19		*Anas poecilorhyncha*	Indian Spot-billed Duck	LC	DC	M	Ra	APEI
20		*Nettapus coromandelianus*	Cotton-headed Pigmy Goose	LC	ST	M	Ra	APEI
21	Apodidae	*Apus affinis*	Little Swift	LC	IN	R	C	AI
22	Ardeidae	*Bubulcus ibis*	Cattle Egret	LC	IN	M	UC	GLI
23		*Ardeola grayii*	Indian Pond Heron	LC	UN	R	C	GLI
24	Capitonidae	*Megalaima haemacephala*	Coppersmith Barbet	LC	IN	R	Ra	FGIS
25		*Megalaima viridis*	White-Cheeked Barbet	LC	ST	R	C	FGIS

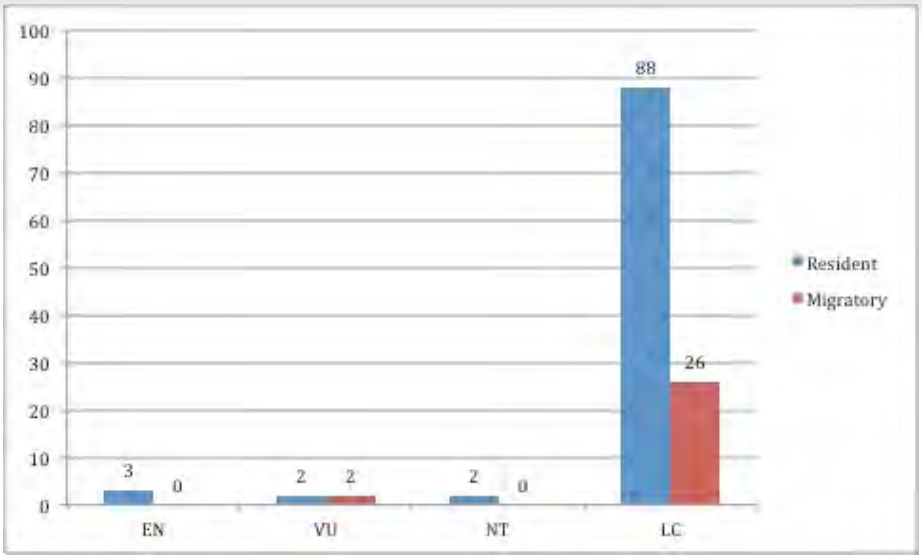
	Family	Species name	Common English name	IUCN status	IUCN population trend	Residential status	Relative abundance	Feeding guild
26	Caprimulgidae	*Caprimulgus asiaticus*	Common Indian Nightjar	LC	ST	R	Ra	USI
27	Ciconiidae	*Ciconia episcopus*	Wooly Necked Stork	VU	DC	M	Ra	TCI
28	Charadriidae	*Vanellus indicus*	Red-Wattled Lapwing	LC	UN	R	Ra	GLI
29	Columbidae	*Columba livia*	Blue Rock Pigeon	LC	DC	R	VC	GSE
30		*Chalcophaps indica*	Emerald Dove	LC	DC	R	C	GSE
31		*Columba elphinstonii*	Nilgiri Wood-Pigeon*	VU	DC	R	VC	GSE
32		*Stigmatopelia chinensis*	Spotted Dove	LC	IN	R	VC	GSE
33	Corvidae	*Corvus splendens*	House Crow	LC	ST	R	VC	ATO
34		*Corvus macrorhynchos*	Large billed Crow	LC	ST	R	VC	ATO
35	Cuculidae	*Centropus sinensis*	Greater Coucal	LC	ST	R	C	TO
36		*Hierococcyx varius*	Common Hawk Cuckoo	LC	ST	R	UC	ATO
37	Dicruridae	*Dicrurus macrocercus*	Black Drongo	LC	UN	R	C	AI
38	Estrildidae	*Amandava amandava*	Red Avadavat	LC	ST	R	UC	GSE
39	Falconidae	*Falco tinnunculus*	Common Kestrel	LC	DC	R	C	SC
40	Hirundinidae	*Hirundo tahitica*	House Swallow	LC	IN	R	C	AI
41		*Lanius schach*	Long-tailed Shrike	LC	UN	R	C	USI
42		*Hirundo smithii*	Wire-tailed Swallow	LC	IN	R	C	AI
43		*Cecropis daurica*	Red Rumped Swallow	LC	ST	M	Ra	AI
44		*Ptyonoprogne concolor*	Dusky Crag Martin	LC	IN	R	UC	AI
45	Meropidae	*Nyctyornis athertoni*	Blue Bearded Bee-eater	LC	ST	R	Ra	AI
46	Motacillidae	*Motacilla cinerea*	Grey Wagtail	LC	ST	M	C	GLI
47		*Motacilla maderaspatensis*	Large Pied Wagtail	LC	UN	R	C	GLI
48		*Anthus nilghiriensis*	Nilgiri Pipit*	VU	DC	R	C	FSE
49		*Motacilla flava*	Yellow Wagtail	LC	DC	M	UC	GLI
50	Monarchidae	*Hypothymis azurea*	Black Naped Monarch	LC	ST	M	Ra	SI
51	Muscicapidae	*Prinia socialis*	Ashy Prinia	LC	ST	R	C	USI
52		*Terpsiphone paradisi*	Indian Paradise-flycatcher	LC	ST	R	Ra	AI

	Family	Species name	Common English name	IUCN status	IUCN population trend	Residential status	Relative abundance	Feeding guild
53	Muscicapidae	*Ficedula nigrorufa*	Black-and-Orange Flycatcher*	NT	DC	R	C	AI
54		*Cyornis rubeculoides*	Blue-throat Blue Flycatcher	LC	IN	M	Ra	SI
55		*Hemipus picatus*	Bar Winged Flycatcher Shrike	LC	ST	M	Ra	AI
56		*Orthotomus sutorius*	Common Tailorbird	LC	ST	R	C	SI
57		*Culicicapa ceylonensis*	Grey-headed Canary Flycatcher	LC	ST	R	VC	USI
58		*Pomatorhinus horsfieldii*	Indian Scimitar-Babbler	LC	IN	R	UC	BGI
59		*Turdoides striata*	Jungle Babbler	LC	ST	R	VC	FGI
60		*Ficedula subrubra*	Kashmir Flycatcher	VU	DC	M	Ra	SI
61		*Eumyias albicaudata*	Nilgiri Flycatcher*	NT	DC	R	VC	SI
62		*Myiomela major*	Nilgiri Blue Robin	EN	DC	R	UC	GLI
63		*Copsychus saularis*	Oriental Magpie Robin	LC	ST	R	C	GLI
64		*Turdus simillimus*	Indian Blackbird	LC	ST	R	VC	FGI
65		*Saxicola caprata*	Pied Bushchat	LC	ST	R	VC	SI
66		*Prinia inornata*	Plain Prinia	LC	ST	R	UC	SI
67		*Cyornis tickelliae*	Tickell's Blue Flycatcher	LC	ST	R	C	SI
68		*Eumyias thalassina*	Verditer Flycatcher	LC	ST	M	UC	SI
69		*Rhipidura aureola*	White-browed Fantail	LC	ST	R	VC	USI
70		*Cyornis pallipes*	White-bellied Blue Flycatcher	LC	DC	R	UC	SI
71	Nectariniidae	*Nectarinia minima*	Small Sunbird*	LC	ST	R	C	NA
72		*Nectarinia asiatica*	Purple Sunbird	LC	ST	R	UC	NAI
73		*Leptocoma zeylonica*	Purple-rumped Sunbird	LC	ST	R	UC	NAI
74		*Leptocoma minima*	Crimson-backed Sunbird	LC	ST	R	UC	NAI
75	Paridae	*Parus aplonotus*	Indian Yellow Tit	LC	ST	R	UC	USI
76		*Parus major*	Great Tit	LC	IN	R	VC	USI
77	Pandionidae	*Pandion haliaetus*	Osprey	LC	IN	M	Ra	SC
78	Phalacrocoracidae	*Phalacrocorax niger*	Little Cormorant	LC	UN	R	UC	AC
79	Phasianidae	*Perdicula erythrorhyncha*	Painted Bush Quail	LC	ST	R	VC	FGSI

	Family	Species name	Common English name	IUCN status	IUCN population trend	Residential status	Relative abundance	Feeding guild
80	Phasianidae	*Pavo cristatus*	Indian Peafowl	LC	IN	R	Ra	TO
81		*Gallus sonneratii*	Grey Junglefowl	LC	DC	R	C	FGSI
82		*Galloperdix spadicea*	Red Spurfowl	LC	ST	R	UC	FGSI
83		*Galloperdix lunulata*	Painted Spurfowl	LC	ST	R	UC	FGSI
84	Picidae	*Picus xanthopygaeus*	Little Scaly-Bellied Green Woodpecker	LC	UN	R	UC	FGI
85		*Dinopium benghalense*	Lesser Goldenback	LC	ST	R	UC	FGI
86		*Hemicircus canente*	Heart Spotted Woodpecker	LC	DC	R	UC	FGI
87	Ploceidae	*Carpodacus erythrinus*	Common Rosefinch	LC	DC	M	C	GSE
88		*Passer domesticus*	House Sparrow	LC	DC	R	VC	GSE
89		*Prinia inornata*	Plain Munia	LC	UN	R	VC	GLI
90		*Lonchura punctulata*	Scaly-breasted Munia	LC	ST	R	VC	GSE
91	Psittacidae	*Psittacula krameri*	Rose-ringed Parakeet	LC	IN	R	UC	FSC
92		*Psittacula columboides*	Malabar Parakeet	LC	ST	R	C	FSC
93		*Psittacula cyanocephala*	Plum headed Parakeet	LC	DC	R	UC	FSC
94	Parulidae	*Acrocephalus dumetorum*	Blyth's Reed-Warbler	LC	IN	M	VC	USI
95		*Lduna coligata*	Booted Warbler	LC	IN	R	C	USI
96		*Phylloscopus trochiloides*	Greenish Warbler	LC	IN	M	UC	USI
97		*Phylloscopus affinis*	Tickell's Warbler	LC	ST	M	UC	USI
98	Pycnonotidae	*Pycnonotus cafer*	Red-vented Bulbul	LC	IN	R	VC	FI
99		*Pycnonotus jocosus*	Red-whiskered Bulbul	LC	DC	R	VC	FI
100		*Pycnonotus luteolus*	White-browed Bulbul	LC	ST	R	UC	FI
101		*Iole indica*	Yellow-browed Bulbul	LC	ST	R	UC	FI
102	Rallidae	*Amaurornis phoenicurus*	White-Breasted Waterhen	LC	UN	R	VC	TO
103	Sturnidae	*Acridotheres fuscus*	Jungle Myna	LC	DC	R	VC	TO
104		*Tyto alba*	Barn Owl	LC	ST	R	C	ATC
105		*Ketupa zeylonensis*	Brown Fish Owl	LC	DC	R	UC	ATC

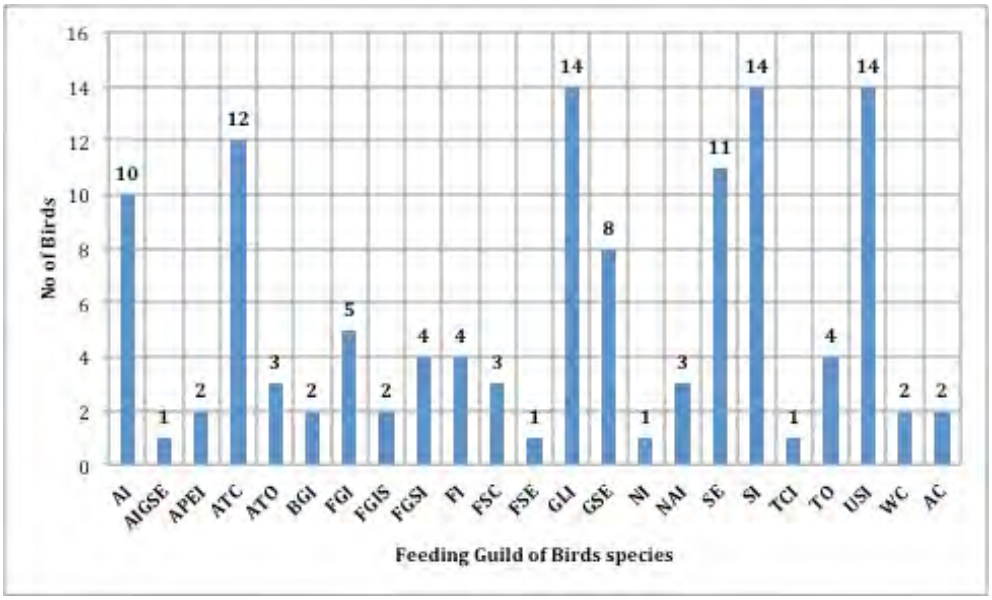
	Family	Species name	Common English name	IUCN status	IUCN population trend	Residential status	Relative abundance	Feeding guild
106	Sturnidae	*Strix leptogrammica*	Brown Wood Owl	LC	DC	R	C	ATC
107		*Tyto longimembris*	Eastern Grass Owl	LC	DC	M	Ra	ATC
108		*Bubo bubo*	Eurasian Eagle Owl	LC	DC	R	UC	ATC
109		*Otus sunia*	Oriental Scoups Owl	LC	ST	R	UC	ATC
110		*Bubo nipalensis*	Spot Bellied Eagle Owl	LC	ST	R	Ra	ATC
111	Sittidae	*Sitta frontalis*	Velvet Fronted Nuthatch	LC	DC	R	C	BGI
112	Rallidae	*Fulica atra*	Common Coot	LC	IN	R	UC	GLI
113	Turdidae	*Brachypteryx major*	Nilgiri Blue Robin *	EN	DC	R	UC	GLI
114		*Luscinia brunnea*	Indian Blue Robin	LC	DC	M	Ra	GLI
115		*Strophocincla cachinnans*	Black-chinned Laughing Thrush	EN	DC	R	VC	GLI
116		*Myophonus horsfieldii*	Malabar Whistling Thrush	LC	UN	R	UC	USI
117		*Monticola saxatilis*	Rufous-tailed Rock-thrush	LC	DC	R	UC	SI
118		*Monticola rupestris*	Blue Caped Rock Thrush	LC	ST	M	Ra	SI
119		*Geokichla wardii*	Pied Thrush	LC	DC	M	Ra	SI
120		*Monticola solitarius*	Blue Rock Thrush	LC	ST	M	Ra	SI
121		*Geokichla citrina*	Orange Headed Thrush	LC	DC	M	Ra	USI
122	Upupidae	*Upupa epops*	Common Hoopoe	LC	DC	R	C	GLI
123	Zosteropidae	*Zosterops palpebrosus*	Oriental White-eye	LC	DC	R	C	USI

IUCN Status: LC-Least Concern, EN-Endangered, VU-Vulnerable, NT-Near Threatened. IUCN Population Trend: DC-Decreasing, ST-Stable, IN-Increasing, UN-Unknown, Residential Status: R-Resident, M-Migratory. Relative Abundance: VC-Very Common, C-Common, UC-Uncommon, Ra-Rare. Feeding guilds: AI-Aerial Insectivore, BGI-Bark Gleaning Insectivore, FGI-Foliage Gleaning Insectivore, SI-Sallying Insectivore, USI-Under-Storey Insectivore, GLI-Grass Land Insectivore, TO-Terrestrial Omnivore, ATO-Arboreal Terrestrial Omnivore, GSE-Granivore Seed Eater, FGS-Frugivore Granivore insectivore seed eater, FSE-Frugivore Seed Eater, FI-Frugivore Insectivore, SC-Sallying Carnivore, ATC-Arboreal Terrestrial Carnivore, TC-Terrestrial Carnivore, WC-Wading Carnivore, NI-Nectarivore Insectivore, N-Nectarivore, AIGSE-Aquatic Insectivore, Granivore, Seed Eater, APEI-Aquatic, Plant Eater, Insectivore, TCI-Terrestrial Carnivore, Insectivore, AC-Aquatic Carnivore



Frequency of sighting of recorded birds species respected to their Resident and Migratory status in Doddabetta Hills, The Upper Nilgiris

carnivore (ATC) (10%) are dominate the profile in guild analysis. Followed by, foliage gleaning Iinsectivore (FGI), frugivore granivore insectivore seed eater (FGSE) (4%) and frugivore insectivore (FI) (3%) and minimum number of feeding guild was observed on aquatic insectivore, granivore, seed eater (AIGSE), terrestrial carnivore, insectivore (TCI), nectarivore insectivore (NI), N = nectarivore, AIGSE= aquatic insectivore, granivore, seed rater (GSE) (1%) respectively. It has been found that there are certain species of birds in the study area that have been classified under different threat categories by the IUCN (version 2017-2). Of these, *Brachypteryx major, Myiomela major* and *Strophocincla cachinnans* was placed in the Endangered category and *Columba elphinstonii, Anthus nilghiriensis, Ciconia episcopus* and *Ficedula subrubra* were placed in the Vulnerable category and two species (*Ficedula nigrorufa, Eumyias albicaudata*) were placed in the Near Threatened category. All the remaining species (n 3/4 114) are placed in the Least Concern category (Table 1) followed by population trend of the species was described by IUCN shows that stable (51 species) followed by decreasing (39 species) increasing



Feeding guild status of recorded birds species in Doddabetta Hills, The Upper Nilgiris

Table 2. Relative Diversity (RDi) of various avian orders and families at Doddabetta Hills, Nilgiri Plateau, Tamil Nadu, India

	Order	Family	No. of species	RDi
1	Accipitriformes	Accipitridae	14	11.38
2	Accipitriformes	Pandionidae	1	0.81
3	Anseriformes	Anatidae	3	2.44
4	Apodiformes	Apodidae	1	0.81
5	Bucerotiformes	Upupidae	1	0.81
6	Caprimulgiformes	Caprimulgidae	2	1.63
7	Charadiiformes	Charadriidae	1	0.81
8	Ciconiiformes	Ciconiidae	1	0.81
9	Columbiformes	Columbidae	4	3.25
10	Coracilformes	Alcedinidae	3	2.44
11	Coracilformes	Meropidae	1	0.81
12	Cuculiformes	Cuculidae	2	1.63
13	Falconiformes	Falconidae	1	0.81
14	Galliformes	Phasianidae	5	4.07
15	Gruiformes	Rallidae	1	0.81
16	Passeriformes	Corvidae	2	1.63
17	Passeriformes	Dicruridae	1	0.81
18	Passeriformes	Estrididae	1	0.81
19	Passeriformes	Hirundinidae	5	4.07
20	Passeriformes	Motacillidae	4	3.25
21	Passeriformes	Monarchidae	1	0.81
22	Passeriformes	Muscicapidae	20	16.26
23	Passeriformes	Nectariniidae	4	3.25
24	Passeriformes	Paridae	2	1.63
25	Passeriformes	Parulidae	4	3.25
26	Passeriformes	Ploceidae	4	3.25
27	Passeriformes	Pycnonotidae	4	3.25
28	Passeriformes	Sittidae	1	0.81
29	Passeriformes	Sturnidae	8	6.50
30	Passeriformes	Turdidae	9	7.32
31	Passeriformes	Zosteropidae	1	0.81
32	Pelecaniformes	Ardeidae	2	1.63
33	Pelecaniformes	Phalacrocoracidae	1	0.81
34	Piciformes	Capitonidae	2	1.63
35	Piciformes	Picidae	3	2.44
36	Psittacidae	Psittacidae	3	2.44

(19 species) and unknown (14 species).

Discussion

The present study shows that Doddabetta Hills of the Nilgiris represents a sound avifaunal diversity. The hills are lies in an important ecological zone in the Western Ghats mountain ranges. Doddabetta hills are the highest peak of the Nilgiri District, Western Ghats, southern India. These hills are located in the centre of the Nilgiri district and receives a high amount of rainfall compare that other part of the Nilgiri. As many as more villages are situated inside the hills and villages are on the periphery. Most people in these villages are chiefly dependent on agriculture for their livelihood. Therefore, a variety of habitats and environments of this hill attract and support a variety of bird species. In this study Muscicapidae is the largest family of birds recorded. In generally

Muscicapidae is the largest family of birds in India with 370 species (Manakadan & Pittie 2001). Similarly, many other investigators such as Sharma (1998), Chhangani (2002a,b), Sankar et al. (2006) and Yaseen et al. (2011) have also found Muscicapidae to be the largest family in the different protected areas in India. A significant number of insectivorous species, present in the study area, are important agents of bio-control of insect pest in agriculture, horticulture, and forests (Mahabal 2005; Thakur et al. 2010). In Nilgiris Plateau the avian diversity are carried out in the lower plateau of the Nilgiris (Gokula 1998). In upper Nilgiri Plateau only few studies were investigating the diversity of birds (Davison 1883; Cardew 1885; Baker & Inglis 1930; Zarri et al. 2005; Peter et al. 2015; Manikandan & Balasubramanian 2016). In Nilgiris Plateau most of the works are focused either on a single species or bird group (Betts 1931; Khan 1979; Islam 1985; Thirumurthi & Balaji 1999; Vijayan et al. 2000; Peter et al. 2015). The present study is the pioneer work on the bird diversity in Upper Nilgiri Plateau. The presence of several villages in and around the hills is another important problem for the fauna of this region. During the study period, it was observed that increasing human population and interference in the forest areas are disturbing many shy and visiting bird species. This is the first report on the avifauna of this area. Furthermore, more field work and scientific studies on birds are necessary to prepare a suitable outline of the conservation plans for the area. In the future, with the improvement of the forest cover, proper management programs and strategies in the hills will not only increase the number of resident bird species but will also attract migratory and vagrant species.

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WESTERN YELLOW WAGTAIL

Photographic record of leucistic *Motacilla flava* from Porbandar, Gujarat

Aberrantly coloured Western Yellow Wagtail (Photo: Dhaval Vargiya)

IUCN Red List: Global: Least Concern (Birdlife International 2017)

Aves
[Class of Birds]

Passeriformes
[Order of perching birds]

Motacillidae
[Family of Pipits and Wagtails]

Motacilla flava
[Western Yellow Wagtail]

Species described by Linnaeus in 1758

The sighting of Leucistic Western yellow wagtail *Motacilla flava* at Karly II Wetland (21.632030^{0}N & 69.650875^{0}E) of Mokarsagar Wetland Complex of Porbandar District, Gujarat, on 22 March 2015, is probably the first known published record of leucism in Western Yellow Wagtail from India. Records of colour aberrations in Indian birds between 1886–2015 have been already published but do not include Wagtail sp. (Mahabal et al. 2016).

Western Yellow Wagtail is a common winter visitor to Gujarat and seen in suitable habitats across the state (Ganpule 2016). Head, nape and ear-coverts are dark slate-grey, sometimes with a trace of a white supercilium. Back is olive and wings brown with two yellowish bars. Tail is dark brown with white outer edge.

The bird is bright yellow from chin to under tail-coverts. Winter plumage is duller, with the grey on head mixed with olive. Sexes are more or less alike. Western yellow wagtail affects pastures and moist grassy ground especially along riversides and on jheel margins (Ali & Ripley 1971).

Global Distribution:
Native: Afghanistan; Albania; Algeria; Angola; Armenia; Austria; Azerbaijan; Bahrain; Bangladesh; Belarus; Belgium; Benin; Bhutan; Bosnia and Herzegovina; Botswana; Bulgaria; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; China; Congo; Congo, The Democratic Republic of the; Côte d'Ivoire; Croatia; Cyprus; Czech Republic; Denmark; Djibouti; Egypt; Equatorial Guinea; Eritrea; Estonia; Ethiopia; Finland; France; Gabon; Gambia; Georgia; Germany; Ghana; Gibraltar; Greece; Guinea; Guinea-Bissau; Hungary; India; Iran, Islamic Republic of; Iraq; Ireland; Israel; Italy; Jordan; Kazakhstan; Kenya; Kuwait; Kyrgyzstan; Latvia; Lebanon; Liberia; Libya; Liechtenstein; Lithuania; Luxembourg; Macedonia, the former Yugoslav Republic of; Malawi; Mali; Malta; Mauritania; Moldova; Monaco; Mongolia; Montenegro; Morocco; Mozambique; Namibia; Nepal; Netherlands; Niger; Nigeria; Norway; Oman; Pakistan; Palau; Poland; Portugal; Qatar; Romania; Russian Federation (Central Asian Russia, Eastern Asian Russia, European Russia); Rwanda; San Marino; Saudi Arabia; Senegal; Serbia; Sierra Leone; Slovakia; Slovenia; Somalia; South Africa; South Sudan; Spain; Sri Lanka; Sudan; Swaziland; Sweden; Switzerland; Syrian Arab Republic; Tajikistan; Tanzania, United Republic of; Togo; Tunisia; Turkey; Turkmenistan; Uganda; Ukraine; United Arab Emirates; United Kingdom; Uzbekistan; Western Sahara; Yemen; Zambia; Zimbabwe

Vagrant: Cape Verde; Comoros; Faroe Islands; Iceland; Maldives; Seychelles; Svalbard and Jan Mayen

Mokarsagar Wetland complex is a group of wetlands including Kuchhadi, Subhashnagar, Zavar, Karly I, Karly II, Vanana, Dharampur, Gosabara, and Mokarsagar Wetlands of Porbandar district of Gujarat State, India. The huge area of more than 10,000ha, the source of freshwater for many farmers and villagers, is really a lifeline for people and wetland dependent biodiversity including birds, reptiles, insects and mammals.

On the afternoon of 22 March 2015, author spotted one leucistic wagtail at 16:18hr and observed the bird for 30 minutes: feeding, bathing and preening. The bird was as active as other individuals of wagtails in the nearby shallow water habitat. Normal Western Yellow Wagtails were aware of the presence of this "odd" looking individual but none reacted. Infact, a normal Western yellow wagtail appear pretty close while it was bathing

Aberrantly coloured with normal Western Yellow Wagtail (Photo: Dhaval Vargiya)

Aberrantly coloured birds are easy to spot and birders share many sightings on social media. Generally referred as "albino", aberrantly colour birds can be described in seven separate aberration categories based on lack or excessive melalin deposition.

Generally, overall colour of plumage is the result of biological pigments (mostly melanins and carotenoids), structural colour or a combination of the two (Mahabal et al. 2016).

As not completely white (partial albinism) with some yellow pigment and pinkish bill, it's recognized as leucistic individual. The vent was yellow in colour, which confirms it as Yellow Wagtail over Citrine Wagtail *Motacilla citreola*, White Wagtail *Motacilla alba*or White-browed Wagtail *Motacilla maderaspatensis*. Grey Wagtail *Motacilla cinerea* would have otherwise bright yellow vent, the tail would be longer and the overall body would also be slimmer (Grimmett et al. 2015).

This sighting is the first published report of colour aberration in Western yellow Wagtail from Indian subcontinent.

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Human Elephant Coexistence: Creating awareness to the school children of Erode district

Rengasamy Marimuthu

The International Elephant Foundation *IEF* funded a project ***"Fostering Human Elephant Coexistence (HECx) awareness in Erode, Tamil Nadu, India"***. The main objective of the project is to conduct a teacher training workshop on human elephant coexistence for 25 teachers and 25 mass awareness programmes for students and through this reaching out 2500 students who live in human elephant conflict areas. On 16-17 November, 2017 the teacher training was conduced at Bharathi Vidhyalaya Matriculation Higher Secondary School. Twenty five (25) teachers from Thuckanaickenpalayam, Anthiyur, Sathyamangalam, Bargur, Thalavadi and Bhavanisagar block participated. The schools were selected by the Distirct Eco Club Coordinator based on the intensity of human elephant confict in those areas. Please click on to see the report:

Mrs. T. Geetha inaugurating the awareness programme at Onthanai school and Mr. L. Vijeyendran, NGC Coordinator also at the dias

Taught about elephant facts

Project Manager, ZOO, Coimbatore. Email: marimuthu@zooreach.org

Mini drama on habitat loss

Playing mini dramas with the theme poaching

http://www.zoosprint.org/ZooPrintMagazine/2017/December/34-39.pdf

As a second part of the project, the school awareness programmes were conducted in the month of February 2018. The authour visited all the schools, met the trainee teacher, discussed with them how they utilised the training with the students by using the elephant teaching guide. We came to know that almost all the teachers conducted some kind of teaching about the human elephant coexistence with the students. Some of them taught the students the mini dramas they learned and students perfomed the dramas to other students. The following schools were visited with a team of Ms. T. Geetha, District Eco Club Coordinator, o/o Chief Education Officer, Erode and Mr. L. Vijeyendran, District National Green Corps Coordinator.

1. Panchayat Union Middle School Arigiyam
2. Government High School, Chikkarasampalayam
3. Government Higher Secondary School, Kembanaicken Palayam
4. Government Higher Secondary School, Kalkadambur
5. Govt. Girls Hr. Sec. School, Thuckanaickenpalayam
6. Govt. Tribal Residential Middle School, Kuttaiyur
7. Panchayat Union Primary School, Oosur
8. Panchayat Union Primary School, Velampatti
9. Panchayat Union Middle School, Thalakkarai
10. Government Tribal Residential Middle School, Kongadai
11. Panchayat Union Middle School Onthanai
12. Panchayat Union Middle School Bejalatti
13. Panchayat Union

Primary School, Periya Ullepalayam
14. Panchayat Union Middle School, Periyakallipatti
15. Government Tribal Residential Middle School, Bathri Padugu
16. Panchayat Union Middle School, Anaikkarai Post
17. Panchayat Union Middle School, Thattkarai
18. Panchayat Union Primary School, Sujjilkarai
19. Panchayat Union Middle School, Irutti Palayam
20. Panchayat Union Primary School, Thikkarai
21. Panchayat Union Primary School, Uginiyam
22. Panchayat Union Middle School, Malliammandurgam
23. Panchayat Union Middle School, Kurumbur
24. Panchayat Union Primary School, Mallayanapuram
25. R.C. Primary School, Mudianur

Wore mask and carrying a placard and ready for taking HECx pledge

Awareness rally at the campus

In each school about 100 students were participated in the awareness programmes. So, we reached about 2500 students as most of them had the chance to see or confront with the wild elephants at their villages. So this awareness program will definitely help them how to behave with the wild elephants.

First of all they were told about the difference between Asian and African elephants, some interesting elephant facts such as their trunk, tusk, ears, skin, nail, their body weight and height, walking and running speed, the day's requirement of food and water, lifespan, habitat, subspecies and their ecological role and why we have to save them, the reasons for human elephant confict and do's and don't's

in elephant areas in detail.

ZOO developed a elekit education packet in local language and it comprises of booklet, mask, wristband (*Rakhi*), placard and a sticker. The usage of packets were demonstrated. The students were given some time to to go through the materials and then they tied the wrist band with each other by taking a pledge to avoid human elephant conflcit, wore a elephant mask and carrying a placard and marched for elephant conservation at the class room or campus.
ZOO also devloped a phamplet which has few tips on to avoid confrontation with elephants in order to save their precious life. The phamplets also distributed to them. At the end they were requested to to share the information with the family members and others.

In some schools the trainee teachers arranged mini dramas based on the script avaiable in elephant teaching guide to the team, other teachers and students to see and evaluate. The dramas were really superb and they used lots of properties. We suggested the teacher trainees to take this kind of initiatives to other students at the school and also using the students to spread out human elephant coexistence to the villagers.

My sincere thanks goes to Internantional Elephant Foundation for funding the project, Ms. T. Geetha, District Eco Club Coordinator, O/o Chief Education Officer, Erode and Mr. L. Vijeyendran, NGC Coordinator, Gobi Education District for their throughout coordination and participation for smooth running of education programs and all the teacher trainees and their headmaster/headmistress and students to carry out the project very successfully.

Girls Higher Secondary School, TN Palayam students gather to form an elephant

World Wildlife Day celebration at Sathyamangalam Tiger Reserve

On 20 December 2013, United Nations General Assembly in its sixty-eighth session decided to proclaim March 3 as a World Wildlife Day to mark the day of the adoption of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1973 which plays an significant role in safeguarding that international trade does not threaten the species' survival. The CITES secretariat with the collaboration of United Nations Organization facilitates the event every year.

C.H.Padma IFS giving welcome address. Anand, IFS, Arunlal IFS and Madhivanan WCCB on the dias

Madhivanan WCCB explaining about sample wildlife artefacts which are in trade

The overall objective of the day is to raise awareness on the importance of protecting wild flora and fauna. These have an intrinsic value and contributes ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic aspects of human well-being and sustainable development and the urgent need to take action to fight against wildlife crime and reduce the human impacts on wild species.

This day is celebrated under a theme every year and this year's theme was ***"Big cats: predators under threat".*** Big cats are facing many and varied threats such as habitat loss, poaching, illegal trade, loss of prey and human animal conflicts. The day gives us the opportunity to raise awareness about their plight and to galvanize people's support.

In line with the objectives, Wildlife Crime Control Bureau in association with

Marimuthu talks about big cats and its threats

Sathyamangalam Tiger Reserve and with the support of Zoo Outreach Organisation, Coimbatore honoured the day at Sathyamangalam. About 60 forest personnel including forest rangers, foresters, guards, and watchers participated. C.H. Padma, IFS, District Forest Officer/ Deputy Director, STR, Hasanur inaugurated the event by welcoming the gathering and gave a brief overview about the day's importance. S. Anand, IFS, District Forest Officer, Erode continued with giving more information on the importance of the day and CITES role in saving endangered species trade. P.G. Arunlal, IFS, District Forest Officer/ Deputy Director, STR, Sathyamangalam and C. Sakthivel, Biologist, STR were also present.

As part of the programme, R. Marimuthu from Zoo Outreach Organization gave a detailed presentation on big cats. The big cats includes lion (*Panthera leo*), tiger (*Panthera tigris*), leopard (*Panthera pardus*) and jaguar (*Panthera onca)* that can roar but also cheetah (*Acinonyx jubatus)*, snow leopard (*Panthera uncial)*, puma (*Puma concolor)* and clouded leopard (*Neofelis nebulosa & Neofelis diardi*) that are found in Africa, Asia, North America, South America. He gave information about each cat's etymology, taxonomy and subspecies, characteristics, current distribution and habitat and historical distribution, behaviour, IUCN Red List status, the major threats and conservation actions.

At the end more emphasis was given to tiger conservation in India by sharing details about Project Tiger history and its objectives, National Tiger Conservation Authority started following Tiger Task Force recommendation constituted by then Prime Minister of India in 2005, current tiger reserves in India which spread out in 18 states, all India tiger estimation and current population status and the modern technologies used for counting tigers.

Mr. Madhivanan, Wildlife Inspector, Wildlife Crime Control Bureau, Kochi gave a presentation on "Wildlife Crime Scenario in India and Role of WCCB" and "Real or Fake' how to identifying the wildlife articles. He started with functions of WCCB under Wildlife Protection Act 1972 Section 38 Z, the organogram, its various field offices and publications. Further he

The forest officers administering an oath to save big cats

added why wildlife crime must be prevented, the wildlife offence happens due to food, sports and trade. The various commodities in trade, value of the trade, the levels of the trade, Wildlife Protection Act 1972 and its definitions on animals, the importance collection points of wildlife in India, the animals which are in trade both lives in terrestrial and marine habitats, the community involves in tiger poaching and the kinds of weapons they used for and also trade of medicinal and ornamental plants.

In the second part he exchanged knowledge on how to identifying the wildlife objects fake or real. He explained with good photographs about how to identify tiger and leopard skins, ivory identification tips, elephant tail hairs, how to identify the products which made up of snake, monitor lizard and crocodile skins, also identification of mongoose hair, bird's feather, musk, pangolin scales, turtle plastron and corals. The forest personnel were very keen in learning new things. Then the participants wore tiger masks and carrying a placard supplied by ZOO and took a pledge to save the big cats from threats. The forest department at the end felicitated the resource persons.

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World Wildlife Day celebration Nehru Zoological Park, Hyderabad

On 3rd March, 2018 Nehru Zoological Park, Hyderabad celebrated World Wildlife Day to promote the importance of wildlife and conducted an education programme to School children as well as zoo visitors. The programme was conducted during 10: 00 hrs to 13: 30 hrs in presence of Assistant Conservator of Forests, Biologists, Education Officer and Zoo staff members. The whole programme was monitored by Ms. Shivani Dogra, IFS., Curator, Nehru Zoological Park, Hyderabad.

A talk show on tigers in front of zoo animal enclosure

Children's are identifying the Cheetah, Jaguar and Indian Leopard by using signage board

A total of 160 students and visitors actively participated in the occasion of World Wildlife Day on the theme of ***"Big Cats: Predators under threat".*** The students assembled at children park zone. They listened to Poster presentations and learned current conservation status of big cats namely Royal Bengal Tiger, Indian Leopard, Asiatic Lion, African Lion, Cheetah and Jaguar. Their habit and habitats, breeding season, life span and population status in wild were explained. Later on, we distributed Tiger Mask's to children's and a rally was organised in the zoo premises. Subsequently the group was taken to big cats and small cats enclosures and they listened to Tiger talk show on conservation of big cats, briefed difference between Leopard, Jaguar and Cheetah and stated occurrence threats to wild animals.

Drawing and essay

writing competitions were conducted for the children. About 5 schools and individuals were who among the visitors participated in the competition.

Nehru Zoological Park, Hyderabad officers distributed the prizes to the winners.

Children with Tiger mask

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A group photo: Participants and Zoo staff

World Wildlife Day celebration in Chennai Snake Park

School children viewing the stall and interacting with our team (Snake Park & ENVIS)

On 3 March, as per the IUCN directive and the suggestion of the Central Zoo Authority, Ministry of Environment & Forests, New Delhi the "World Wildlife Day" was celebrated in the Chennai Snake Park. The theme of the programme was "***Snakes – animals under threat***" to suit our zoo. In co-ordination with the ENVIS Centre in the Zoology Department, University of Madras, Guindy campus, a stall displaying contents related to snakes and their conservation was put up.

A pull-out on the Big Four venomous snakes of India including their photographs and pertinent text was prepared for this programme. Multiple copies were printed and added to the stall. This was freely distributed to the visitors who interacted with the stall team. This apart, posters on common snakes of Chennai, picture post cards on common Indian snakes, as well as our books and journals on wildlife were displayed in the stall. Interested visitors procured some of the study materials as well.

Our zoo educator volunteers comprising of zoology students from Stella Maris College, JBAS College and Vivekananda College were also present. Our volunteers gave a guided tour around the zoo to the school children. After this and their interaction with the stall team, quiz progammes were conducted to those children. Nearly 600 students from as

much as 15 schools visited Chennai Snake Park.

Good performers were awarded with prizes (our books on the subject). Prizes were distributed to 25 best performers of each class. The event was well attended with school children being the main beneficiaries. Apart from school children who came on their own with their family also participated in quiz and interactive sessions.

Zoo Educator Volunteers from JBAS College, Chennai explaining about reptiles to school children

Our Executive Trustee, S. Paulraj, IFS (Retd.) and our Trustee, V. Kalaiarasan headed the event. R. Rajarathinam, Director and S.R. Ganesh, Dy. Director & Scientist, CSPT as well as ENVIS members G. Karuna Sagaran, Scientist-D, P. Thirumurugan, Information Officer, D. Siva Arun, Programme Asstt. conducted the event and attended the stall, explaining to the visitors.

Our thanks to The Executive Chairman and Trustees of Chennai Snake Park Trust for instigating and encouraging this activity. We thank the H.O.D. Zoology Dept. and the Chief Coordinator, and all the staff of ENVIS Centre, Guindy Campus for their kind concurrence for joint programme and their very active cooperation. Thanks are also due to the Zoology Dept. Heads of JBAS College, Stella Maris College and Vivekananda College for deputing their students as Zoo Volunteers and the students for their time and inputs.

Submitted by: R. Rajarathinam and S.R. Ganesh, Chennai Snake Park, Chennai. Email: cspt1972@gmail.com

National Workshop on Venomous Scorpions, their identification features, first aid and clinical treatment for scorpion sting

A national level workshop entitled "Venomous Scorpions, their identification features, first aid and treatment for Scorpion sting" was organized by the Department of Zoology & Wildlife Biology, Government Arts College, Udhagamandalam, The Nilgiris, Tamil Nadu on 13.10.2017 to enrich scientific knowledge on proper identification of scorpions, first aid and clinical treatment for Scorpion sting for teachers, forest field level staffs, conservationists, naturalists, wildlife photographer and representative from NGO's took part in the workshop totalling to 230 participants.

P. Kannan, during the inaugural said that scorpion sting is an acute life threatening medical emergency. A substantial number of scorpion sting incidences, human deaths and long-lasting complications or life-long disabilities could be avoided by some knowledge of proper identification of scorpions, precautions against scorpion and proper mode of treatment and by becoming more familiar with them by learning to recognize them, by knowing the environs they frequent and their behaviour. Hence this workshop was organized to pave the way to prepare an Alogrithm for general identification of the major kinds of scorpions based on their venomous nature, enriching scientific knowledge on first aid and clinical treatment for scorpion sting to save thousands of life from scorpion sting cases. Moreover this workshop was planned to showcase to study the scorpions which have medical significance, scorpions which commonly cause deaths or serious disability to humans.

During the inaugural Amar Kushawha, I.A.S the Project Director, Special Area Development Program, said that, scorpion

Welcome address by Dr. P. Kannan, Asst. Professor and Organising Secretary

sting is a serious medical, social and economic problem in many parts of the world, especially in the tropical and subtropical countries. Reasons may be because of its high population density, widespread agricultural activities and prevalence of venomous scorpion species. Scorpion sting mostly happen in rural areas, majority of scorpion sting happens at night and the mortality rate is highest in rural areas due to poorly constructed houses, providing easy access to scorpions and manual jobs in agricultural fields. Moreover, students, forest field level staff, naturalists, wildlife photographers who, by the very nature of their work, the environment they work they are also suffer due to scorpion sting incidences, hence necessary awareness to be created among general public and students regarding proper identification of scorpions, precautions against scorpion sting.

K. Rajkumar, IFS, District Forest Officer, Nilgiris South Forest Division who presided over the function, said that human scorpion conflict is an age old phenomenon but there is a need for a change in this mindset now. Stressing the importance of such a workshop, he said that scorpion sting is a major health hazard that leads to high mortality especially in rural India. He said

that all sections of the society should know how to handle scorpion sting incidences and spoke about the ecological role of scorpions to our ecosystem.

R. Sanil Associate Professor, Department of Zoology & Wildlife Biology said to the audience to demolish the myths and superstitions connected with scorpion sting treatment procedures.

Technical Sessions

Technical sessions about scorpions external characters and anatomical features, scorpions distribution pattern, identification of venomous scorpions, first aid and clinical treatment for scorpion sting were taught by J. Ebabasar, Head of Department, Dept of Zoology & Wildlife Biology, and by P. Kannan, Assistant Professor and Tolstoy, MD, PSG Hospital, Coimbatore mentioned that, scorpion sting is an acute life threatening medical emergency. Scorpion will not always inject venom when is stings. It can control its ejaculation with each sting which is usually 0.1 to 0.66 mg. Scorpion venom may contain multiple toxins and other compounds. The venom is composed of varying concentrations of neurotoxins, cardiotoxins, nephrotoxins, hemolytic toxins, phosphodiesterases, phospholipases, hyaluronidases, glycosaminoglycans, histamins, serotonin, tryptophon and cytokine releasers. He also spoke about clinical manifestation, medical care, local treatment and medical care systemic treatment and by giving Prazosin, a competitive post synaptic alpha1, adreno-receptor antagonists should be the first line of treatment. Prazosin is available as scored 1mg tablet. Sustained release tablets are not recommended in this condition. The dose recommended is 30 microgram/ kg/dose. This is given as an immediate measure in all with evidence of autonomic storm. It should not be given as prophylaxis. Intropes and diuretics may be required. Blood pressure, pulse rate and respiration must be monitored every 30 minutes for 3 hours, every hour for next 6 hours and later every 4 hours till improvement. Prazosin should be repeated in the same dose at the end of 3 hours according to clinical response and later every 6 hours till extremities are warm, dry and peripheral veins are visible easily. Scorpion antivenom is the treatment of choice after stabilization and supportive care. Scorpion antivenom must be administered,without skin test, as early as possible and through venous route. Because of the heterogeneneity of venom composition between different scorpion species, one species antivenom will have limited effect on another's venom. Usefulness of scorpion antivenom varies between countries.

A section of participants of the workshop on Scorpions

Some of the preventive measures are
1. protective clothing, such as shoes or gloves, may prevent some scorpion envenomations.
2. check shoes, glove, clothing, and backpacks for scorpions prior to use.
3. keep yards free of debris, which can serve as a place for scorpions to hide.
4. make sure windows and doors fit tightly to prevent scorpion entering the house from outside
5. avoid walking barefoot, especially at night when scorpions are active mostly at night.

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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.

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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.

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