

ZOO'S PRINT

Communicating Science for Conservation

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

Action plan for the control of commensal, non-human primates in public places

Mewa Singh, Iqbal Malik, Wolfgang Dittus, Anindya Sinha, Aniruddha Belsare, Sally Walker, Sanjay Molur, Belinda Wright, Janaki Lenin and Sujoy Chaudhuri

Conflict with Non-Human Primates

Conflict with non-human primates is related to levels of tolerance, a dynamic that is influenced by the degree of disturbance to pursuance of human activities caused by the animals. There can thus be no predetermined number of non-human primates that can be predicted to cause conflict.

Non-human primates display aggression towards humans primarily over food (crops, tourist feeding, etc.); non-human primates become bold when they have learned that an easy meal can be won by showing dominant behaviors towards humans. From a non-human primates' point of view a human engages in an act of subservience towards it by giving it food - and it may follow up with aggression if food is withheld or not given. In short, by feeding non-human primates humans are teaching them to

be aggressive towards humans. They may also become aggressive when they perceive that a human is threatening one of their youngsters.

Conflict with non-human primates may arise from:

1. populations of non-human primates in public spaces, which may cause conflict by sheer number alone;
2. aggression by some or all of the non-human primates resident within public spaces that leads to attacks/biting and human injury;
3. the decreasing space between non-human primates and human settlements which results in crop raiding and garbage eating;
4. the resulting decline of remaining populations, e.g. those left after poisoning, shooting, etc.;
5. the translocation of non-human primates into areas where no conflict was reported earlier;

Editor's note:

This compilation was developed and submitted to the Ministry of Environment and Forests, Government of India by the authors of the Action Plan in 2005. In light of the new committees formulated to look at human-wildlife negative interactions (conflict) by the Ministry of Environment, Forests and Climate Change, it is important to publish this document so that it is consulted by the new committees who can perhaps use this as a base for further work.

A few taxonomic changes have occurred since the 2005 Action Plan listed below. Since the 2019 IUCN Red List is being updated currently, the assessments have not been updated on the Action Plan as they are subject to change in a few cases.

2005 Action Plan

Semnopithecus entellus achates
Semnopithecus entellus anchises
Semnopithecus entellus entellus
Semnopithecus entellus schistaceus
Semnopithecus entellus ajax
Semnopithecus entellus hector
Semnopithecus entellus hypoleucos
Semnopithecus (Trachypithecus) johnii johnii
Trachypithecus obscurus phayrei

Current valid name

Semnopithecus hypoleucos achates
Semnopithecus priam anchises
Semnopithecus entellus
Semnopithecus schistaceus
Semnopithecus ajax
Semnopithecus hector
Semnopithecus hypoleucos
Semnopithecus johnii
Trachypithecus phayrei

6. the likelihood of these populations increasing due to their accessibility of garbage, feeding by tourists, etc;
7. destruction of crops;
8. approaching or entering houses, government works etc.;
9. the transmission of zoonotic diseases from human to non-human primate and *vice versa*;
10. guides encouraging feeding to promote contact with tourists, etc.

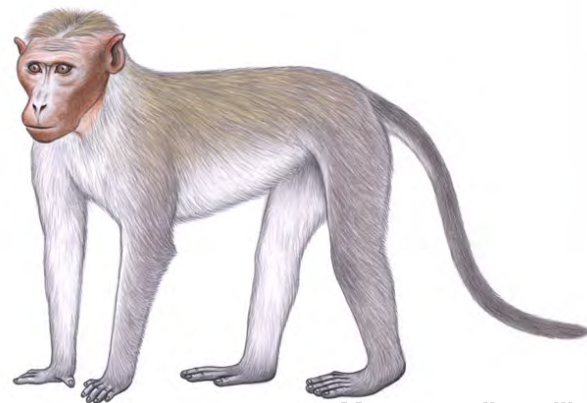
All non-human primates have the potential of becoming commensal, but the following list covers those subspecies which are currently reported to be in conflict with humans in India:

1. *Macaca mulatta mulatta*,
Indian Rhesus Macaque
2. *Macaca radiata radiata*,
Dark-bellied Bonnet Macaque
3. *Macaca radiata diluta*,
Pale-bellied Bonnet Macaque
4. *Semnopithecus entellus achates*,
Western Hanuman Langur
5. *Semnopithecus entellus anchises*,
Deccan Hanuman Langur
6. *Semnopithecus entellus entellus*,
Bengal Hanuman Langur
7. *Semnopithecus entellus schistaceus*,
Central Himalayan Langur
8. *Semnopithecus priam priam*,
Coromandel Grey Langur
9. *Semnopithecus priam thersites*,
Grey Langur
10. *Semnopithecus entellus ajax*,
Himalayan Grey Langur

All but the first four of the species listed above have been categorized as Near Threatened, Vulnerable or Endangered by the IUCN, highlighting the need for a differential, species-specific approach to the management of conflict with non-human primates in public places.

Management of the Conflict

Control of conflict with non-human primates necessitates the use of both preventive and reactive management methods. The MoEF, GoI (April, 2005) has currently elucidated on an Action Plan for the control of this conflict, suggesting that translocation and the sterilization of male non-human primates be implemented as part of the core management strategy.



Macaca radiata diluta

Problems with translocation

The IUCN defines translocation as the movement of living organisms from one area for free release in another. However, conservation-based translocation is quite distinct from the literal meaning of the term. IUCN guidelines (Woodford, 2001) for conservation-based translocation state:

“Given that any release incurs some risk, the following precautionary principle should be followed:

If there is no conservation value in releasing confiscated animals to the wild or no management program exists within which such release can be undertaken according to conservation guidelines, the possibility of accidentally introducing a disease, or behavioral & genetic aberrations that are not already present in to the environment, however unlikely, should rule out returning confiscated specimens to the wild as placement options.”

Translocation is essentially a conservation technique applied in management of endangered species which have been locally extirpated from their historic range, and may be carried out to augment existing populations or as a means of species re-introduction under captive breeding programs where it is deemed that every individual is critical to the survival of the species.

IUCN Guidelines also state:

It is now widely recognized by wildlife veterinarians that every wild creature that is the subject of a translocation or rehabilitation release must not be regarded as just a single animal but rather as a package containing an assortment of potentially dangerous viruses, bacteria, protozoa, helminthes and arthropods, any of which may become pathogenic in new situation involving stressed individuals in a changed environment.

Being held in captivity for weeks together introduces behavioral modifications in wild animals and makes them prone to disease and parasitic infestation. The latter may actually make the animals prone to attack humans after release and thus create conflict situations at release sites. This is generally compounded by faulty management like improper cage design & repeated exposure to humans.

Problems with sterilization of male non-human primates

As a means of population control it is virtually useless to sterilize male non-human primates, because any immigrating or any intact male could potentially impregnate every female in the population - non-human primates are polygynous. Females, not males, need to be the target of sterilization, because they are the “bottle-necks” to population growth. Secondly, testosterone levels in male non-human primates motivate male aggression among males that contest for female mates. Non-human primates (males and females) are aggressive towards humans not for reasons of mating (unlike elephants in musth, non-human primates don't just lash out at moving creatures).

The authors of this document have jointly attempted to prepare an alternative plan to the one currently proposed, while considering aspects of management of conflict with non-human primates from a scientific, veterinary and legal perspective.

Proposed

Prevention and control of conflict with Non-Human Primates in public places Rules, 2005

Under the sub-section (b) (ii) of section 12 of the Wildlife (Protection) Amendment Act, 2002

1. Short title and commencement:

- a. These rules may be called the Prevention and Control of Conflict with Non-human Primates in Public Spaces Rules, 2005.
- b. They shall come into force on the date of their final publication in the Official Gazette.
- c. Non-human primates are listed under various Schedules of the Wildlife Protection Act and as such shall be governed by the

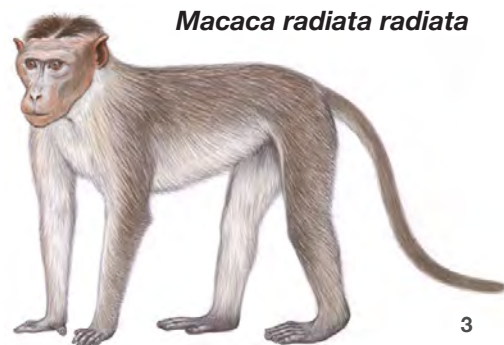
laws specified therein. These present Rules however, shall relate to non-human primates in conflict in public places.

2. Definition:

In these Rules, unless the context otherwise requires, -

- a. “Non-human Primates” means the species listed in Annexure I;
- b. “Conflict” means a situation where citizens have cause for complaint arising from non-human primates in public spaces that may create nuisance, harassment and/or biting which results in human injury and/or damage to crops and other private property;
- c. “Relocation” means the transfer of non-human primates to permanent shelters, depending on species as described in the categories provided in Annexure I;
- d. “Public spaces” means a place where the people in general have an access and wherein they congregate and/or a place owned by a public authority and open to the public in general (from CrPC, Section 133 (1)(a)).
- e. “Act” means the Wildlife (Protection) Amendment Act, 2002;
- f. “Ministry” means the Ministry of Environment and Forests & CC;
- g. “Forest Department” means the local Forest Authority;
- h. “Committee” means a committee appointed under these Rules;
- i. “Local authority” means a municipal committee, district board or other authority for the time being invested with the control

Macaca radiata radiata



and administration of any matters within a specified local area;

j. “Accredited agency” means an NGO recognized by the Ministry of Environment and Forests & CC;

k. “Veterinary doctor” means a person holding a degree from a recognized veterinary college and registered with the Indian Veterinary Council.

3. Formation of Central Monitoring Committee

A Central Monitoring Committee consisting of the following persons shall be constituted by the Ministry of Environment and Forests & CC:

- a. The Secretary, Ministry of Environment and Forests who shall be the ex-officio chairman of the committee;
- b. The Member-Secretary, Central Zoo Authority of the Ministry of Environment and Forests & CC;
- c. A primatologist or veterinarian from the faculty of the Wildlife Institute of India who shall be responsible for providing the Committee with conservation requirements of the species;
- d. A representative of the National Institute of Communicable Diseases (NICD), New Delhi who shall provide the Committee with annual estimates of the sylvatic cycle of rabies transmission to humans;

e. A representative from the faculty of the Indian Veterinary Research Institute (IVRI) with expertise in wildlife medicine or an independent, private practitioner with the required expertise as the Ministry may see fit;

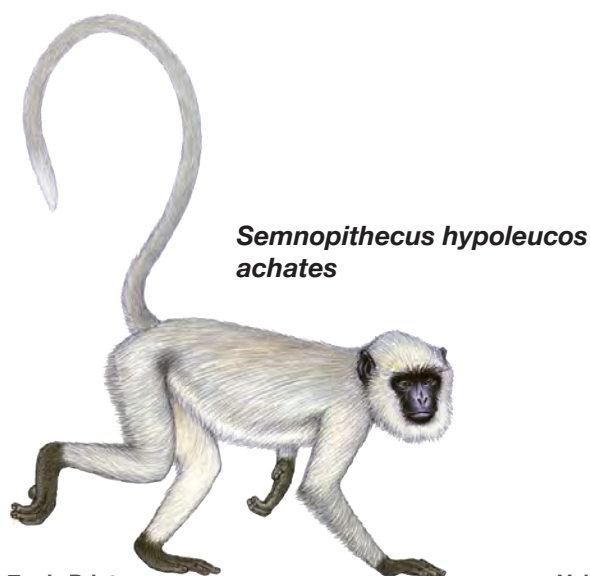
f. An accredited individual with expertise in primatology to be appointed by the Ministry, preferably a member of the IUCN Primate Species Specialist Group;

g. A representative of an accredited, national-level NGO with wildlife experience.

4. Functions of the Central Committee

The committee constituted under Rule 3 above shall be responsible for planning, prevention and management of conflict with non-human primates in accordance with these Rules at the National level. The Committee shall:

- a. Collate results of bi-annual surveys of non-human primate populations and complaints of non-human primate-related nuisance submitted by Local Committees constituted under Rule 5 below. For this purpose, the Central Committee shall convene for a minimum of twice in a year, during which time these Rules shall themselves be subject to re-assessment, revision or amendment as may be determined by the flow of information from the bi-annual surveys;
- b. Monitor control measures implemented in different States to analyze their impacts on reduction in conflict levels. The Central Committee may suggest corrective and/or remedial measures as may be necessary from time to time;
- c. Issue guidelines for operations involving the control, capture, transportation, sheltering, vaccination and treatment of non-human primates in conflict situations;
- d. Monitor the functioning, maintenance and management of permanent shelters for relocated non-human primates;
- e. Facilitate training programs for Forest Department Staff, zoo personnel, local NGOs and veterinarians on survey techniques, trapping procedures and veterinary protocols to be implemented.



Such training shall involve certification, and only certified personnel shall be involved in procedures necessitating control of conflict with non-human primates;

f. Maintain a National Registry of all non-human primates maintained in shelters. This Registry shall also record all non-human primates maintained in Research Laboratories for bio-medical research purposes. The Committee shall endeavor to work with the CPCSEA to ensure that all bio-medical research requirements that are based on primate models shall be met using animals housed in shelters.

g. Keep a watch on national and international developments in the field of research pertaining to non-human primates and their control and management, development of vaccines and cost-effective methods of control etc.

5. Formation of Local Committees

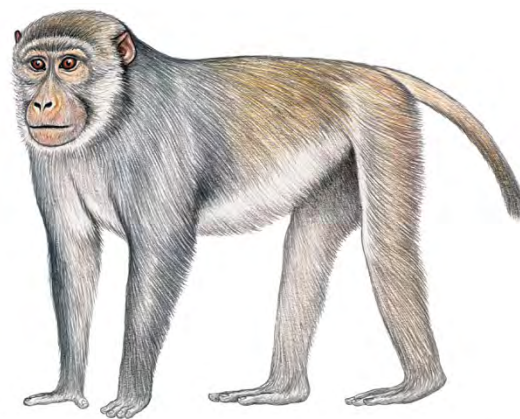
Monitoring committees consisting of the following persons shall be constituted at State level by the Local Authority

- a. Commissioner/Chief of the Local Authority who shall be the ex-officio chairman of the committee;
- b. The Wildlife Warden;
- c. A representative of the Public Health Department of the Local Authority;
- d. A veterinary doctor with expertise in wildlife medicine;
- e. A representative of an accredited local NGO;

6. Functions of the Local Committee

The committee constituted under Rule 5 above shall be responsible for planning, prevention and management of conflict with non-human primates in accordance with these Rules. The Committee shall:

- a. Conduct bi-annual surveys of non-human primate populations within its jurisdiction through independent, accredited agencies recognized by the Ministry. Surveys must provide information



Macaca mulatta

on the total number, number of loners and sub-groups and their age- and sex- wise distribution;

b. Take steps to monitor conflict with non-human primates and maintain detailed records of complaints of non-human primates arising from the local public;

c. Oversee operations involving the control, capture, transportation, sheltering, vaccination and treatment of non-human primates according to Guidelines issues by the Central Committee;

d. Issue instruction regarding the prevention of feeding of non-human primates in public spaces;

e. Create awareness, solicit cooperation and public funding;

f. Keep abreast of national and international developments in the field of research pertaining to non-human primates and their control and management, development of vaccines and cost-effective methods of control etc.

7. Preventive management

a. *In situ* Sterilization of female non-human primates

Based on the results of bi-annual surveys, non-surgical alternatives to sterilization (using the immunocontraceptive vaccine Porcine Zona Pellucida, PZP) shall be provided intra-muscularly after the animal has been physically restrained and anesthetized. Attempts shall be made to target at least 70% of the resident female non-human primates occupying any public place. Following the specified recovery time, the animals shall be

released within the area from which they were trapped. The procedures shall be conducted under veterinary supervision by an authority of the Forest Department and shall be continued for as long as the Local Committee deems necessary. Detailed procedures to be followed during implementation of this procedure are provided in Annexure II;

b. Active prevention of feeding in public spaces

The Local Authority shall issue and enforce regulations that prevent the public from feeding non-human primates in public spaces and areas inhabited by non-human primates, including lands under the authority of the Forest Department. The Public shall be informed of these rules by their publication in at least two local language dailies, public announcements, signage or by any additional means as the Committee deems fit. Such rules shall include instructions for the disposal of garbage, and installation of such devices as may be suggested by the Committee to keep public spaces monkey-proof. Because the feeding of non-human primates happens to be a religious and cultural practice widely prevalent in the country, these Rules should ensure that such activities occur only under controlled circumstances in order to prevent conflict with the public at large. Pilgrims, worshippers and other members of the public should instead be directed to complete their supplications within the premises of permanent shelters that have been established under these Rules

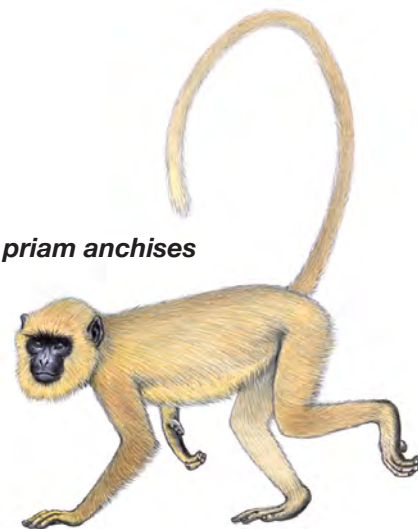
8. Reactive management

a. Capture

Non-human primates shall be permitted to be captured for relocation only when complaints from the local public are deemed by the Local Committee to have exceeded tolerance limits.

The Local Authority shall make available to the public a telephone number and/or address to which the public may report any complaints with regard to non-human primates. The Public Health Department of the Local Authority shall maintain detailed records indicating the nature and

Semnopithecus priam anchises



frequency of such complaints to enable monitoring and prompt action when tolerance levels are breached. Following monthly analysis of these records, the Local Committee may issue instructions for the capture and removal of specified numbers of non-human primates from within specific public spaces.

Only teams constituted of staff of the Forest Department, and under the supervision of local primatologists/scientists where available, shall conduct the capture operations. Detailed procedures to be followed are provided in Annexure III. Such teams may approach the Ministry for funds for acquisition of equipment necessary for capturing non-human primates that include, but are not limited to, (i) blow-pipes; (ii) walk-in traps; (iii) throw nets; and (iv) transportation cages.

Procedures for control in cases of crop damage caused by populations resident part- or whole-time within RF, PF, USF or WLS/NP's shall be decided on a case-by-case basis, using (i) *in situ* population control (ii) compensation (iii) any alternative methods as may be determined by the Central Committee in preference to capture and relocation.

b. Relocation

Non-human primates that have been captured following instruction by the Local Committee shall not be released into forested areas and other natural and semi-natural habitats, whether within the State or outside its boundaries.

These animals shall instead, be housed permanently in shelters established for this specific purpose. Such shelters may be maintained and managed by accredited NGOs on approval by the Central Committee, and established near Temples/ other religious places where the public may fulfill their religious obligations (offerings etc.) under controlled circumstances. Land and other facilities may be provided to these organizations at subsidized cost by the Local Authority and/or the Forest Department.

NGOs may approach the Ministry for establishment funds necessary to erect such shelters according to guidelines issued by the Central Committee. Guidelines for the establishment of such shelters are provided in Annexure IV. Annexure V provides guidelines for accredited agencies seeking to establish such permanent shelters. The Wildlife Warden shall be appointed to the Board of any such shelter to be established and shall be responsible for overseeing operations in accordance to provisions of the Act and any such rules, regulations or instructions as issued by the Central Committee.

All non-human primates maintained in such permanent shelters shall be sterilized (using surgical or alternative means) to ensure that populations within the shelters do not exceed the intake limits to be decided by the Central Committee.

9. Application of Rules where local bye-laws etc. exist

If there is in force in any area to which these Rules extend, any Act, rule, regulation or bye-law made under any law for the time being in force by the State or local authority in respect of any of the matters for which provision is made in these Rules, such rule, regulation or bye-law shall to the extent to which:

- The conflict with non-human primates occurs on lands under the authority of the Forest Department, be of no effect;
- It contains provisions less irksome to the animal than those contained in these Rules, shall prevail;
- It contains provisions more irksome to the animal than those contained in these Rules, be of no effect.

Annexure I:

Category A: Species and subspecies to be sterilized and relocated to permanent non-human primate shelters

Species	Common Name	Conservation Status
<i>Macaca radiata diluta</i>	Pale-bellied Bonnet Macaque	Least Concern
<i>Macaca radiata radiata</i>	Dark-bellied Bonnet Macaque	Least Concern
<i>Semnopithecus entellus achates</i>	Western Hanuman Langur	Least Concern
<i>Macaca mulatta mulatta</i>	Indian Rhesus Macaque	Least Concern (R)*
*R - Regional		

Category B: Species and subspecies to be relocated to permanent shelters or conservation breeding centers/zoos as specified by the Central Committee

<i>Macaca fascicularis umbrosa</i>	Nicobar Long-tailed Macaque	Near Threatened
<i>Semnopithecus entellus anchises</i>	Deccan Hanuman Langur	Near Threatened
<i>Semnopithecus entellus entellus</i>	Bengal Hanuman Langur	Near Threatened
<i>Semnopithecus entellus schistaceus</i>	Central Himalayan Langur	Near Threatened

Category C: Species and subspecies to be relocated to conservation breeding centers/zoos as specified by the Central Committee

<i>Semnopithecus (Trachypithecus) johnii johnii</i>	Nilgiri Langur	Vulnerable
<i>Semnopithecus priam priam</i>	Coromandel Grey Langur	Vulnerable
<i>Macaca assamensis assamensis</i>	Eastern Assamese Macaque	Endangered (R)*
<i>Macaca leonina</i>	Northern Pig-tailed Macaque	Endangered (R)*
<i>Trachypithecus obscurus phayrei</i>	Phayre's Langur	Endangered (R)*
<i>Trachypithecus pileatus pileatus</i>	Blonde-bellied Capped Leaf Monkey	Endangered (R)*
<i>Macaca assamensis pelops</i>	Western Assamese Macaque	Endangered
<i>Macaca silenus</i>	Lion-tailed Macaque	Endangered
<i>Semnopithecus entellus hector</i>	Lesser Hill Langur	Endangered
<i>Semnopithecus entellus hypoleucos</i>	Dark-legged Malabar Langur	Endangered
<i>Semnopithecus priam thersites</i>	Grey Langur	Endangered
<i>Trachypithecus geei</i>	Golden Langur	Endangered
<i>Trachypithecus pileatus durga</i>	Orange-bellied Capped Leaf Monkey	Endangered
<i>Macaca arctoides</i>	Stump-tailed Macaque	Critically Endangered (R)*
<i>Semnopithecus entellus ajax</i>	Himalayan Grey Langur	Critically Endangered
<i>Trachypithecus pileatus tenebricus</i>	Tenebrous Capped Leaf Monkey	Critically Endangered
<i>Macaca munzala</i>	Arunachal Macaque	Not Assessed
<i>Macaca thibetana</i>	Tibetan Macaque	Not Assessed
<i>Trachypithecus pileatus brahma</i>	Buff-bellied Langur	Data Deficient
*R - Regional		

Annexure II: Procedures to be followed for *in situ* population control of non-human primates

Dosages, nature of chemicals, veterinary protocols and procedures to be followed during *in situ* population control efforts shall be reviewed, updated and modified as the Central Committee may see fit.

In situ population control programs using immuno-contraceptives are intended to reduce the fecundity of the population over the long term. These Rules, in their current state, suggest the use of Porcine Zona Pellucida vaccine as the immuno-contraceptive for use with non-human primates.

The zona pellucida is the protein layer that surrounds a mammalian oocyte, which must be penetrated by sperm for fertilization to occur. Females are injected IM with an emulsion of

zona pellucida from pig ovaries (Porcine Zona Pellucida, PZP). After inoculation, a females antibody titre is raised sufficiently to block sperm receptor sites on her own ovum, thus preventing pregnancy.

Attempts at *in situ* population control require focused surveys, coordinated trapping, veterinary expertise and follow-up monitoring. No attempts should be made if any of these basic requirements are unavailable or cannot be implemented on site.

Feasibility studies for locations where *in situ* population control can be implemented will be conducted country-wide by a team appointed by the Ministry. This preliminary survey shall be conducted at each location reporting conflict

for a period of at least two months prior to approval of the procedure by the Ministry.

Within each location selected for implementation of an *in situ* population control program, the following teams will be constituted under the authority of the Local Committee:

(i) Survey team

The survey team shall comprise of the following members at minimum:

1. A recognized primatologist or if unavailable, a wildlife biologist or professor of the life sciences from a local University;
2. The Range Forest Officer;
3. Additional staff of the Forest Department/Zoo as may be required.

Such surveys may be contracted out to accredited NGOs that have the required expertise. In all such contracted instances, however, the Range Forest Officer shall be a part of the survey team.

During the survey, the team shall determine group size, number of sub-groups and their composition (age and sex), identification of troop leaders and the number of loners in the area. Movement habits of the troop to be dealt with must be recorded in detail to be able to suggest areas and methods by which efficient trapping can be conducted.

Such surveys shall be conducted at least one month prior to any trapping exercise. During this time, the survey team shall also take the opportunity to educate the general public of the ban on feeding of non-human primates in public places.

(ii) Trapping team

The trapping team shall comprise of the following members at minimum:

1. The Range Forest Officer;
2. Two additional staff of the Forest Department/Zoo with expertise in trapping;
3. A representative of an accredited NGO;
4. A veterinarian, who must be available at all times to deal with any emergencies

The decision on the type of equipment to be used for trapping will depend on local

conditions and expertise available with the trapping team. Trapping efforts must also incorporate suggestions of the Survey Team in order to maximize the number of animals trapped. General guidelines to be followed during trapping are provided in Annexure III.

(iii) Veterinary Team

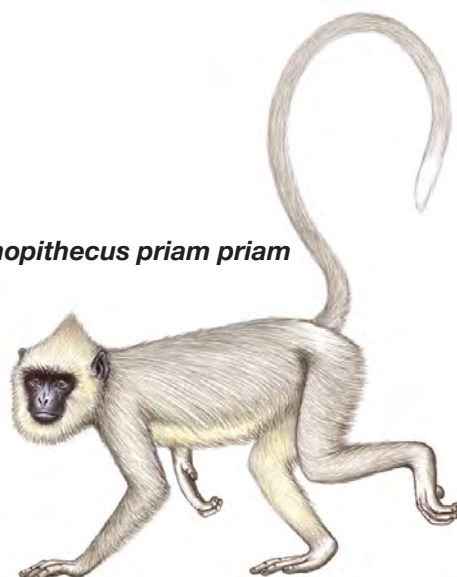
The veterinary team shall be headed by a veterinarian with, at minimum, a graduate degree from a recognized University. The veterinarian shall have the final word on all procedures and methods to be used during the intervention.

In situ population control for non-human primates shall be targeted at females using an immuno-contraceptive vaccine following approval by the Central Committee.

Following the trapping exercise, female non-human primates shall be separated and anesthetized. Physical examination and/or sonographic imaging using hand-held devices shall be used to determine whether the animal is pregnant. Under no circumstances should pregnant females be injected with the immuno-contraceptive. Transponder microchips shall be implanted at the base of the tail to permit identification during subsequent capture, if any, and the unique chip-ID must be recorded in a detailed database containing all records pertaining to that animal.

Non-pregnant female non-human primates shall be immunized with purified 55 kDa glycoprotein from porcine zona pellucida (ZP3) and ZP3 conjugated to the beta subunit of human chorionic gonadotrophin (beta hCG) using adjuvants permissible for human use

Semnopithecus priam priam



(alum, muramyl dipeptide and sodium phthalyl derivative of lipopolysaccharide).

Following delivery of the immuno-contraceptive to all non-pregnant females trapped, the team shall withdraw, but remain within reaching distance of any animal requiring emergency assistance. Veterinary personnel shall remain present on site until all animals have fully recovered.

(iv) Monitoring Team

Members of the Survey Team shall be responsible for conducting detailed monitoring

surveys of troops where *in situ* population control programs are implemented. During these surveys, detailed notes on the behavior exhibited by troops that have been immuno-sterilized are essential. Guidelines for procedures to be followed, data reporting formats etc. shall be provided by the Central Committee. These surveys shall be conducted a minimum of twice a year, and reported to the Local Committee, and thence to the Central Committee, to permit analysis of the scale and need for further interventions.

Annexure III: Guidelines to be followed during capture of non-human primates in conflict situations, within public places

Walk in trap cages or nets may be used to trap non-human primates without breaking family groups. The decision on the type of equipment to be used for trapping will depend on local conditions and the expertise available with the trapping team. Cage traps are sometimes useful in built-up areas, whereas net trapping may be employed in more open areas.

Specific procedures to be followed during trapping shall be prescribed by the Central Committee depending on the results of the preliminary, country-wide survey to be conducted by the Ministry.

Pre-requisites for trap cages:

1. Cages must be light-weight, but care must be taken to ensure that they are sturdy and cannot be manipulated, overturned or tripped by non-human primates from the outside;
2. Bait should not be accessible to non-human primates from the outside of the cage;
3. No sharp projections should be present on the interior of the cage to prevent injury to the trapped animal(s);
4. Trap doors must be designed to ensure that they are self-locking devices;
5. Care must be taken with cage design to ensure that trap doors do not injure the animal(s);
6. Camouflaging of trap cages by innovative means, to maximize trapping of a non-human primate troop

Transportation:

Non-human primates should be tranquilized immediately after trapping. Weight, sexing, examination for ecto-parasites, treatments for external wounds and insertion of a Transponder Microchip should be applied while the animal is under anesthesia. No animal shall be transported without anesthesia.

Transportation cages should be of minimum dimension 3.5'(L) x 3.0'(B) x 3.0'(H), constructed of mild steel or alternatives. Only one animal can be transported in one cage at a time. Adequate access to water and sufficient air circulation must be provided in the vehicle in which cages are to be transported. The Range Forest Officer from the location where the animals are captured, and a veterinarian must accompany all transportation vehicles. The transportation vehicles should be covered so as to provide adequate shade to the animals.

Annexure IV: Guidelines for the establishment of permanent non-human primate shelters

Housing Facilities

The minimum space requirements for holding non-human primates shall follow the Minimum Prescribed Size for Feeding/Retiring Cubicle for Important Mammalian Species of Captive Animals as specified by the Central Zoo Authority, viz:

	Minimum size of outdoor enclosure (sq.m) per pair	Minimum extra area per pair of additional animals (sq.m)
Macaques and Langurs	500.0	20.0

Enclosures must be made escape-proof. The use of locally available materials (such as 8 gauge chain-link fencing of maximum mesh size of 2 inches) will ensure low-cost, easily maintained structures. The enclosures should permit adequate visual access for shelter personnel, while being as unobtrusive as possible for the non-human primates. At least three-quarters of each holding facility shall remain open-to-air, and must replicate natural habitat. Hiding places and other furniture (ropes, etc.) should be provided within the cages.

Placing more than one social group (extended family) of non-human primates in one enclosure will invite fighting among the two or more groups, and fights can be lethal. Linked enclosures (using overhead runs and pathways)

may be used to house larger troops. Enclosures should also be species specific, and no intermixing of species or subspecies shall be permitted.

The shelter must have provision for isolation cages/enclosures where aggressive non-human primates can be housed in isolation. Facilities for chemical and physical restraint must be available within the shelter. Squeeze cages must be available and located at strategic points.

Macaques can eat a variety of foods, but langurs need large amounts of fibrous greens from leaves. Some langurs are very difficult to feed in captivity because for their eclectic diets. Commercially available primate foods (such as ZUPREEM) may be provided as an alternative. Shelters must be able to provide for all food requirements.

Capacity of Shelters

Each shelter shall have a pre-determined maximum capacity of non-human primates to be housed, and under no circumstances will a shelter be permitted to house extra numbers.

Sterilization of inmates

No breeding shall be permitted within permanent shelters. All non-human primates to be housed in shelters shall be permanently sterilized by means of:

1. Males

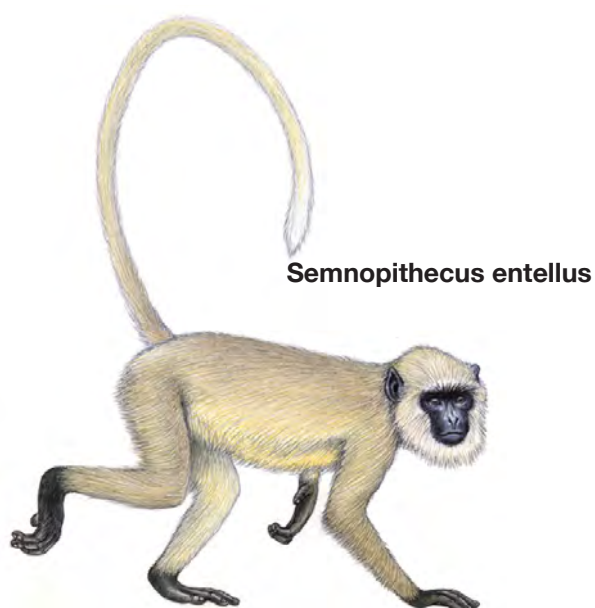
No castrations shall be permitted because this procedure is likely to change the behavioral characteristics of the troop housed within an enclosure. If a decision is taken to sterilize male non-human primates within shelters, ALL males must be sterilized by vasectomy only.

2. Females

If females are to be sterilized, a combination of reversible methods, such as the use of immuno-contraceptives, and separation shall be implemented.

Quarantine facility

Quarantine is the separation of newly received animals from those already in a facility



until the health of the new animals can be reviewed. The purpose of such isolation is to prevent the introduction of infectious disease to the resident captive population. In addition, during this period new animals can become accustomed to their new diets and environment, and baseline veterinary data can be gathered (IUCN SSC, 2002).

A minimum 30-day quarantine period shall be imposed on all new entrants into a shelter. Quarantine facilities should be separate and away from regular housing - ideally, at least 20 meters should separate newly arrived animals from resident animals and a physical barrier

placed between them. Quarantine facilities should be sited downwind of other animals, where wind is predictable, and downstream of other animals, where water flow is predictable.

Veterinary services

A qualified veterinarian should be present at all times at the shelter.

Additional facilities

The Shelter shall provide for structures such as a pre-operative room, Operation Theatre, post-operative room, X-ray room and laboratory facilities.

Annexure V: Guidelines for Application for Funds for the establishment of Permanent Monkey Shelters

1. Agencies applying to establish shelters must prove expertise in being able to cater to the requirements of maintaining non-human primates as provided for in Annexure IV.

2. The organization should have at least two years of experience or working in the related area or should show evidence of competence to take up the proposed scheme.

3. It should not be run for profit to any individual or body of individuals.

4. It should have a property constituted Managing Body with its powers, duties, and responsibilities clearly defined and laid down in a written constitution.

5. A copy of the, site-plans/layout of the proposed building (rough sketch giving a broad indication of the shelter to be constructed and area to be covered etc.) and estimated cost of construction should be submitted. After the proposal has been approved in principle, the institution/organization will have submit blue-prints of plan with detail structural estimates that the construction the building has been permitted. The estimates need not however be approved by State P.W.D. A certificate by the State Government/Approved Value that the rate are not more than the prevailing P.W.D schedule of rates for similar work should suffice.

6. The institution must complete the building within a period of two years from the date of

the receipt of the first installment of grant-in-aid unless extension is granted by the Central Government.

7. A certificate shall also be furnished at the time of the application that a site which is neither already under any lease nor notified by any legislation of the respective state govt., has been acquired for the construction of a building by the voluntary organization/institution concerned. No grant shall be sanctioned unless a site has already been acquired. No portion of the grant shall be utilized for purchase of land.

8. After the completion of the shelter, the organization shall furnish to the Central Government copies of the following documents:

- a. A certificate to the effect that the facility has been completed accordance with the approved plans and estimates, and
- b. A statement of expenditure incurred on the construction of facility, duly audited by the authorized auditors.

9. Extent of Assistance

Financial assistance will be given up to 70% of the approved cost on recurring and non-recurring expenditure and the balance of 30% must be met by the voluntary agency or any other organization, but preferably by the voluntary organization itself. In the case of an organization working in relatively new areas where both voluntary and Government effort is very limited but the need for the service is very

great the Government may bear 100% of the cost.

In the case of shelter grants, the Government grant will be limited to Rs. 25.0 lakhs. In so far as non recurring grant in aid under the scheme is concerned a ceiling of Rs.10.0 lakhs per project shall be observed. However, in exceptional cases the ceiling amount may be relaxed by the Secretary (MoEF) after obtaining the concurrence of the Finance Department.

In so far as grants-in-aid other than for the purpose of building, the pattern of expenditure under this scheme for both existing as well as new projects shall broadly conform with the pattern of expenditure on similar items approved for similar schemes of the Ministry.

However, in exceptional cases deviation may be allowed in consultation with the Finance Department and with the approval of secretary (MoEF).

10. Application and Sanction

Any organization desirous to apply for grant-in-aid under this program will send its application in the prescribed proforma to an authority or body designated for the purpose by the Ministry of Environment and Forest.

On receipt of an application for grant-in-aid inspection will be undertaken by the prescribed agency. On the basis of the inspection and audit of the prescribed agency the proposal will duly be processed.

11. Inspection

The Ministry from time to time will specify the nature, type and periodicity of the inspection and audit and the agency which will be designated to carry out the inspection and audit.

12. Release of Grants-in-aid

Grants will be given in two installments. The first installment will cover 50 per cent of the sanctioned amount and will be released on receipt of the proposal on prescribed Proforma and on finding it correct. The remaining 50 per cent will be released as a second installment. An organization shall, before it receives assistance from the Government of India, execute a continuity bond valid for 5 years in the prescribed Performa to the effect that in the event of its failure to comply by any or

all conditions of the grant it shall be able to refund the whole or such part of the grant as the Government may decide, with interests thereon. The organization shall maintain separate accounts of the grants received under this Program. It shall always be open to check by an officer/agency deputed by the Government. It shall also be open to test check by comptroller and Auditor General of India at his discretion.

13. Re-appropriation

The Institution may re-appropriate expenditure from one sanctioned sub-head to another sub-head to a maximum of 25% in either case. Such re-appropriation will be within the overall sanctioned amount. No expenditure shall, however, be incurred by re-appropriation of savings on items not sanctioned by the Ministry. Savings shall not be re-appropriated for incurring expenditure on staff that has not been sanctioned by the Ministry. All permissible appropriation should be reported to the Ministry. Prior approval for such re-appropriation is not necessary.

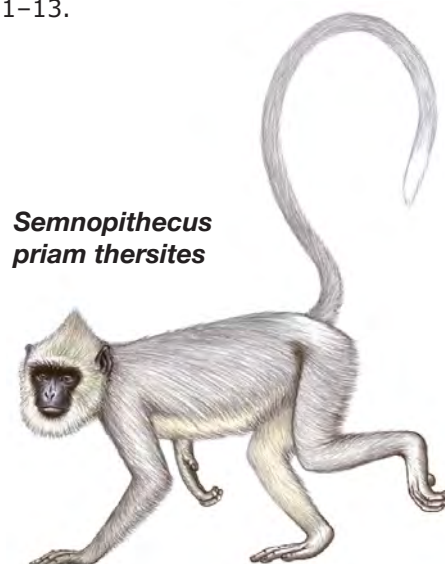
14. Changes in Approved Projects

No major changes will be matter therein even if no additional costs are involved unless the prior approval of the Ministry has been obtained.

15. Termination of Grants:

If the Ministry is not satisfied with the progress of the Project or it finds that these rules are being seriously violated, it reserves the right to terminate the grant-in-aid.

Citation: Singh, M., I. Malik, W. Dittus, A. Sinha, A. Belsare, S. Walker, S. Molur, B. Wright, J. Lenin & S. Chaudhuri (2019). Action plan for the control of commensal, non-Human primates in public places. Submitted to the Ministry of Environment & Forests, Government of India in 2005. *Zoo's Print* 34(11): 1-13.



WILD DETECTIVES: Wild Cats !

Poems by the kids: Once upon a Tiger



*13th October 2019, 20 excited kids gathered around their computers to attend the first Webinar on the Wild Detectives: Wild Cats! Program launched by Mango Education and Zoo Outreach Organisation. A three month course that initiates the child into the exciting world of Discovery, Detection and Deduction. From map reading to poetry to interacting with experts in the field the kids have been busy. Here are a few examples from our very own Wild Rookie Detectives!



Tiger tiger do not cry
I have come to make you smile
Nobodys there to take a try
But, I will make you safe in time

You have seen life in the wild
Go so oh hay wire
Don't fret, don't panic
Don't worry in despair,
Seeing your family helpless,
I know its not fair.

The vast grasslands and thick forests
That once were yours
Are now fragmented and destroyed
It'll take a while to revive your home,
But, I promise to give back what you rightfully Own!.

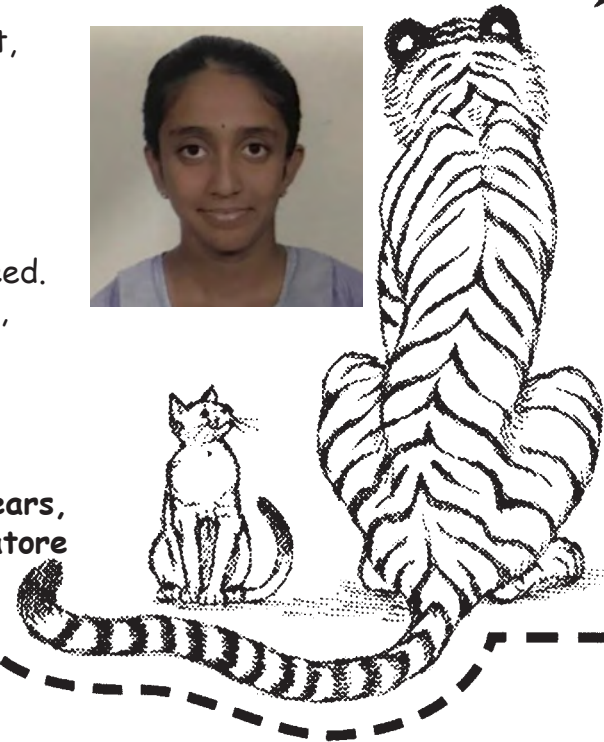
-- Tvaritha B Ramapriya, 11 years, Bengaluru





Tigers are majestic and magnificent,
Without them, life on earth
cannot be independent
They maintain the food chain,
But we give them a lot of pain.
Shouldn't we be thankful to them,
But instead we hunt them for our greed.
Are we to be blamed for their loss,
Or is there any other cause.
Let it roam freely,
So that the world becomes lively!

-- Samriddhi Kamatchi M, 16 years,
Coimbatore



Tiger Oh Tiger,
I know that you are in danger!
Because of our doing
And I'm so sorry.

Langurs, Gaurs and Sambar you!
They are your favourite meal.
Grassland, wetlands and
tropical rainforest,
Is where you are seen.



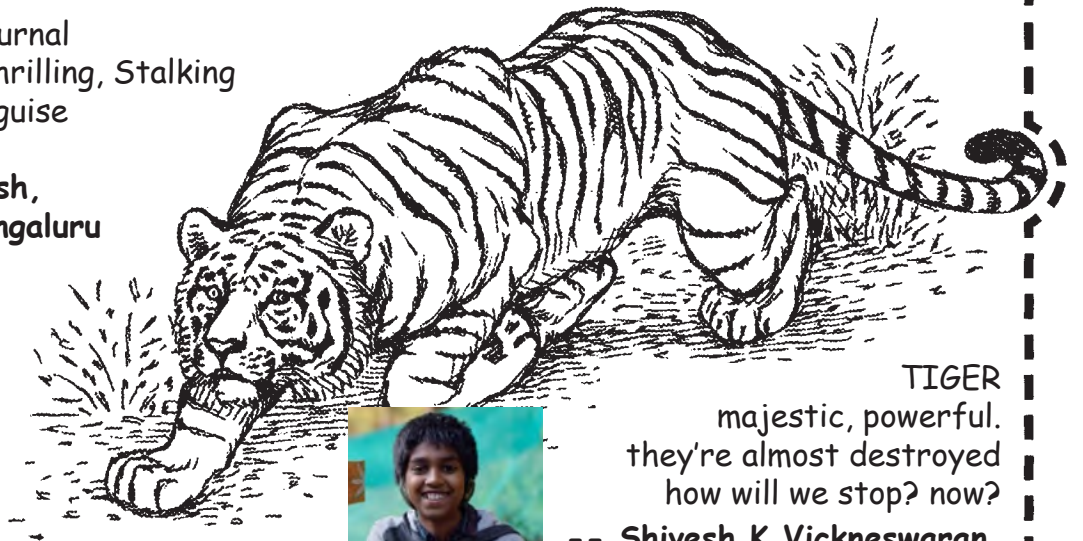
I'll plant more trees,
For you to play.
Your favourite game
And that's hide and seek!!



-- Aarav Jain, 10 years,
Coimbatore



Cat
Striped, Nocturnal
Enchanting, Thrilling, Stalking
Master of disguise
Tiger!!
-- Esha Dinesh,
10 years, Bengaluru



TIGER
majestic, powerful.
they're almost destroyed
how will we stop? now?
-- Shivesh K Vickneswaran,
11 years, Coimbatore



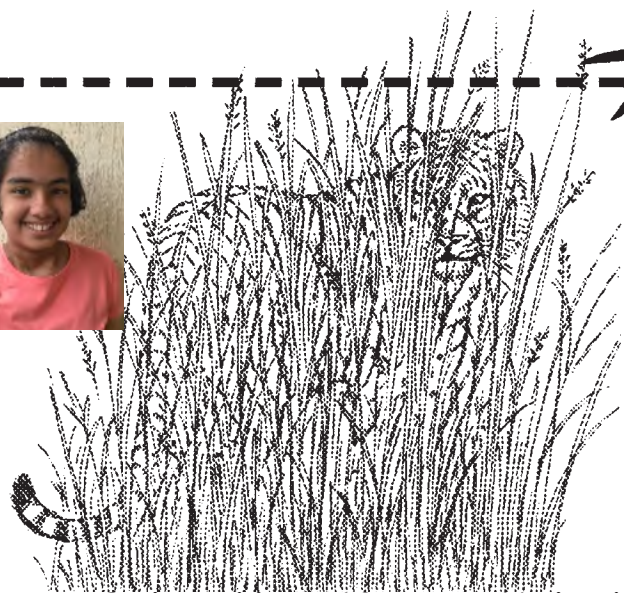
Oh Dear Stripy tiger,
How are you today?
You decreased by thousands
Just from Aril to may.



Its us humans, we are to blame
You're few in number because of us,
We are killing you for claws
Your teeth, skin and furry fur.

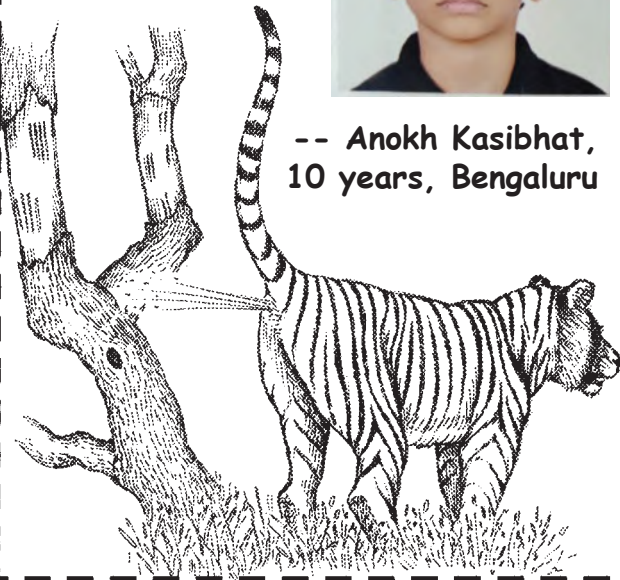
I feel very sorry
Though many others are not
I wish this would end
And we have you not lost.

-- Hamsini Padmanabhan, 12 years, Hyderabad





-- Anokh Kasibhat,
10 years, Bengaluru



Tiger
Oh so ferocious,
But unfortunately for them and us,
We only thought to shun.
For at that time,
it probably seemed fun,
To hate them more than Atilla the hun.

I highly disrespect this
and don't want to say they are extinct.
And they I shall miss.
Now, that ain't the main reason
It's the permanent summer season,
It's taking a toll,
Both us and the tigers are struggling,
To go on a stroll.
Rats now only stay in their holes,
So now, we know the problem,
What are we waiting for,
Lets solve it!

Tigers
Majestic, Fierce
Trying to live
Help save it
Before it disappears

-- Smrithi Vijaykumar,
11 years, Bengaluru



Deep and dark are the woods
Where have you been O my tiger
Come and make this forest Joyful and Bright
For I will be waiting for you

-- Dhanya Saishree M,
14 years, Coimbatore



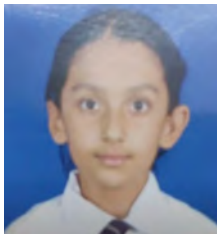


Tigers are in danger
Even though that sounds weird
The species is getting over
And forests are getting cleared

Humans want big cities
And homes just as pretty
So they take the tiger's habitat,
Somebody save the big cat!

All around there are poachers
Hunting the tigers
Just so they could get richer
But what about the tiger?

-- Jahanvi Kartik, 12 years,
Hasimara, West Bengal



This animal is a very
endangered cat
It is nothing to keep
under one's hat
(not to keep a secret).

Now it's your turn
You save them
Stop tiger endangerment
And be their gem
That's all i have for you
In my poem.

It's population is
rapidly on a decrease
It's going down
really fast piece by piece.

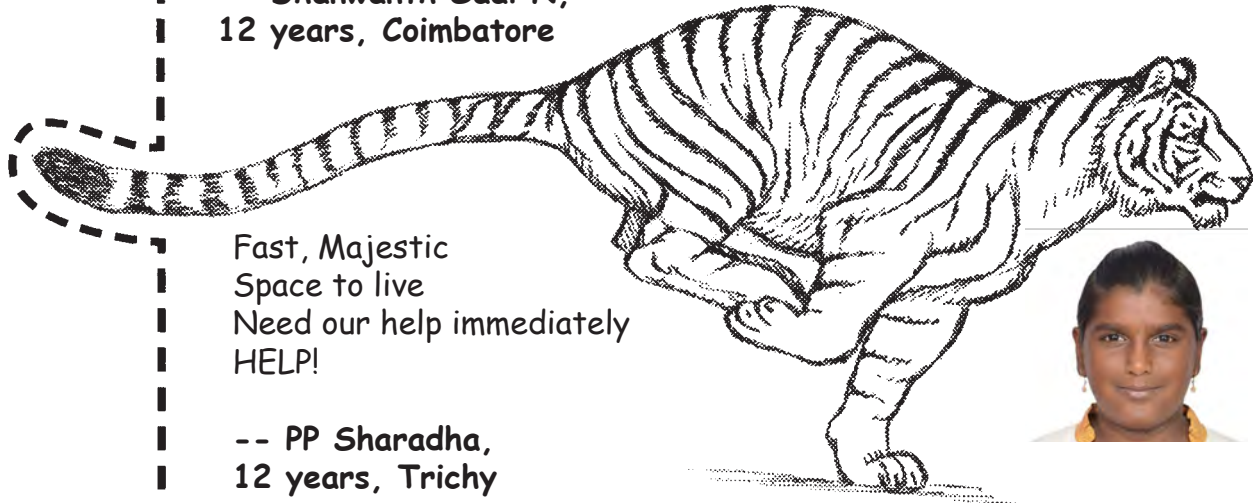
-- Jayant Kartik, 10 years,
Hasimara, West Bengal

Hundred years ago,
they were about a lakh
How i wish I could
turn the clock back.



Carnivore
Fierce, solitary
Hunt kill animal
Meat eater in jungle!
Save!

-- Dhanwanth Saai N,
12 years, Coimbatore



Fast, Majestic
Space to live
Need our help immediately
HELP!

-- PP Sharadha,
12 years, Trichy



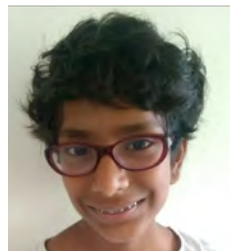
The majestic Indian cat king
Walks with a proud swagger,
And a swing
He used to roam around proudly,
Though now still majestic,
He appears cowardly.
His skin was for the highest bid.
That's why the tiger ran away and hid
Please give this mighty animal
A chance at life and survival.

-- Shreya Venkatesh,
14 years, Chennai



Burning Stripes
Wild
Powerful Elegant
Hunted by part
Stop this utter madness
Immediately!

-- Meera Sanjiv,
12 years, Chennai




Colours of the Wild

Pretty Pair!
Grooming one another
with so much care
such lovely colours
mesmerised we stare!




Rose-ringed Parakeets by P. Sanjai Natraj



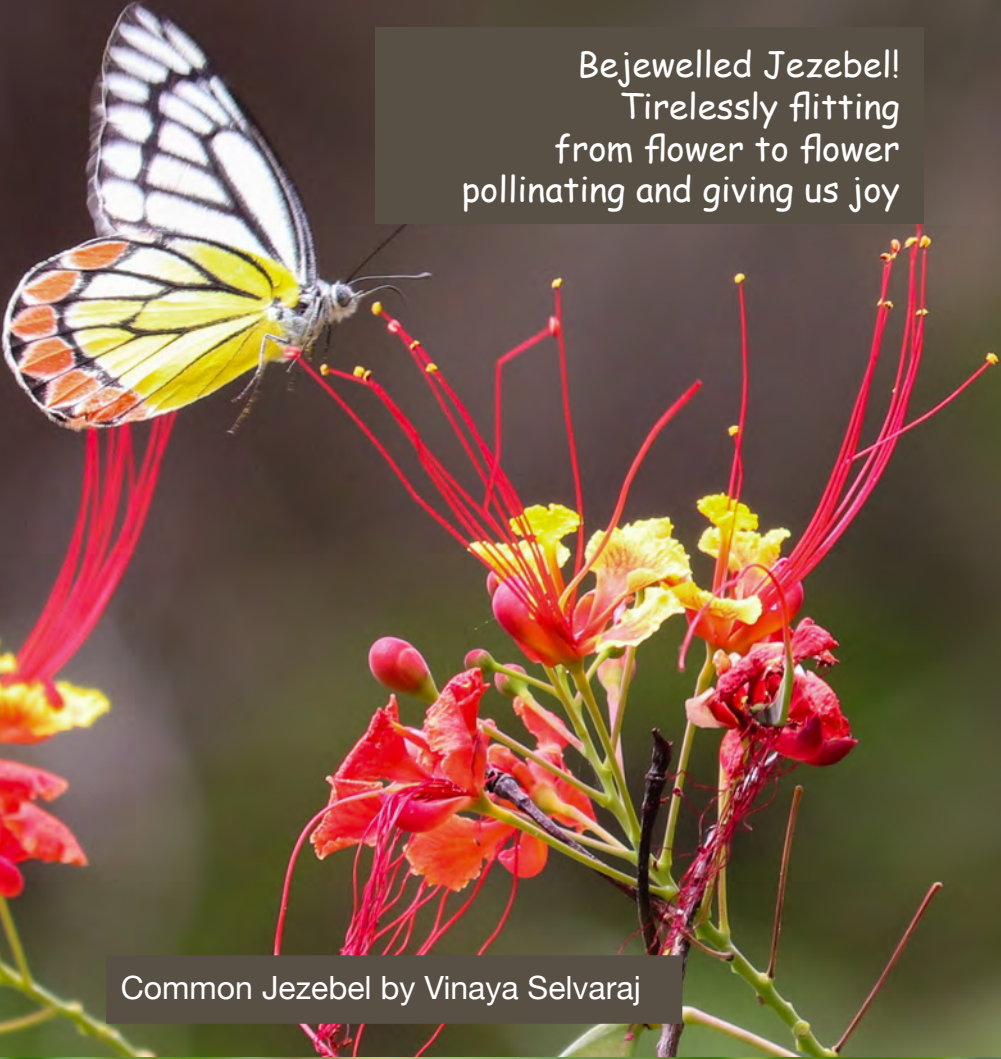
A tiger in the plains!
A lovely butterfly out on the prowl
for some innocent flowers

Plain Tiger by Harshitha Vengetesh




Crouching Dragon!
Predators that hunt mosquitoes
and help us sleep well at night

Dragonfly by B. Mridula




Bejewelled Jezebell!
Tirelessly flitting
from flower to flower
pollinating and giving us joy

Common Jezebel by Vinaya Selvaraj



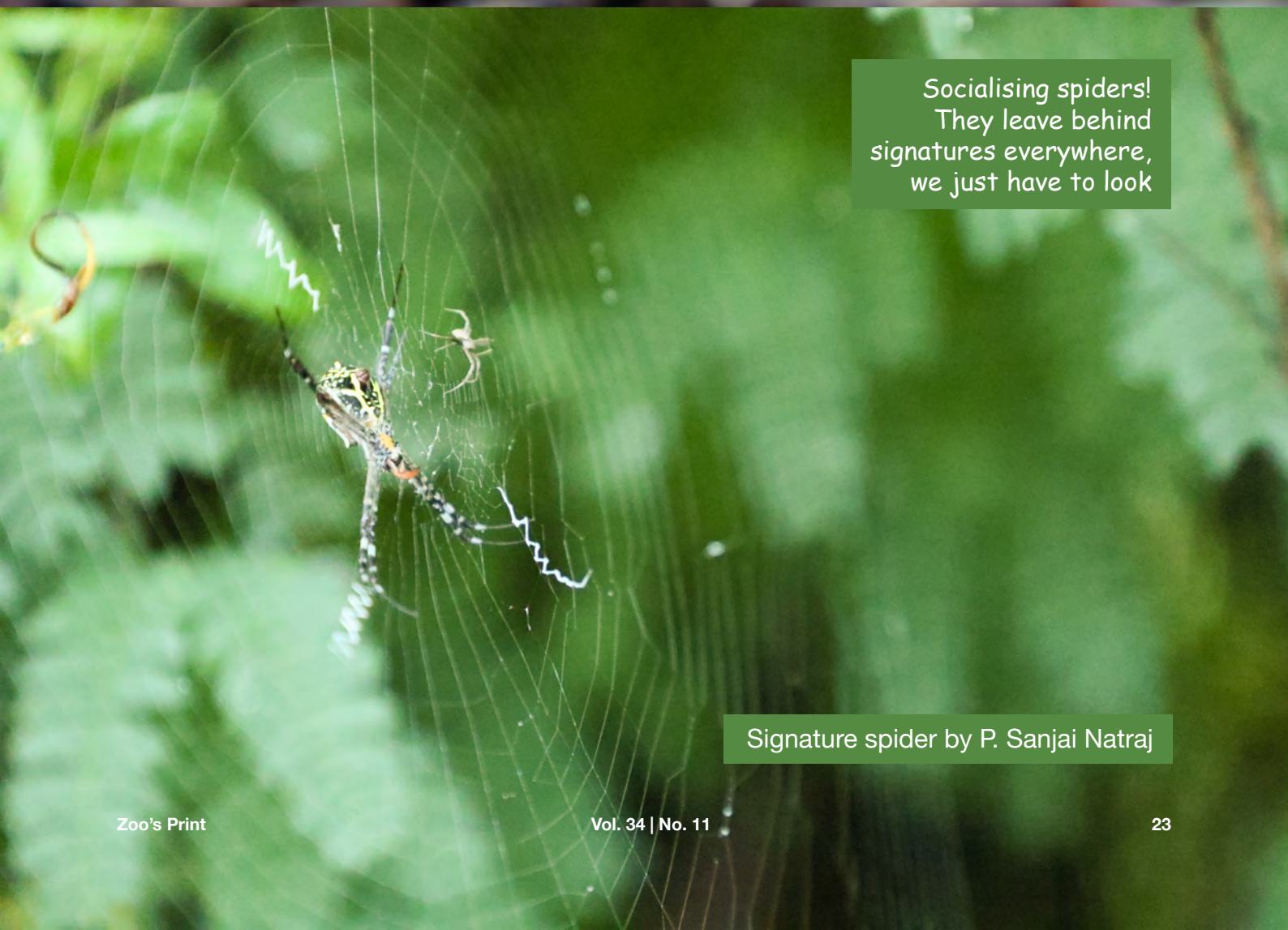
Skipping Skipper!
On a neem tree
at Achankulam Lake,
the skipper was sleeping
ready to go skipping

Skipper by C.V. Pranav Shri Kailash

A close-up photograph of a young tamarind sapling. The sapling has a thin, light green stem and a small, green, pointed bud at the top. It is growing out of a dark, rich forest floor covered with dry leaves, twigs, and other organic matter. In the background, other similar saplings are visible, though they are out of focus.

A new journey!
No matter the circumstances
life always finds a way

Tamarind Sapling by Saeesha Santosh

A photograph of a signature spider on its web. The spider has a yellow and black body with white markings. It is positioned in the center of a large, intricate web that is stretched across a green background. The web is made of many fine, white threads. The background is a soft, out-of-focus green, suggesting a natural habitat.

Socialising spiders!
They leave behind
signatures everywhere,
we just have to look

Signature spider by P. Sanjai Natraj

Home Sweet Home!
The lovely White-breasted Water
Hen settled in its nest

White-breasted Water Hen by Vaibhav S.

Be Free and Fly!
One can only imagine
the joy of soaring in the sky
like this handsome raptor



Brahminy Kite by Vaibhav S.

The natural world is full of extraordinary living organisms and not all of these are clearly understood by all of us. The more we understand of nature, the more we fall in love with it.

In this feature we present a few pictures on nature documented/captured by kids (ages 9-13) in the ongoing Nature Photography course run by Mango Education and Zoo Outreach Organization.

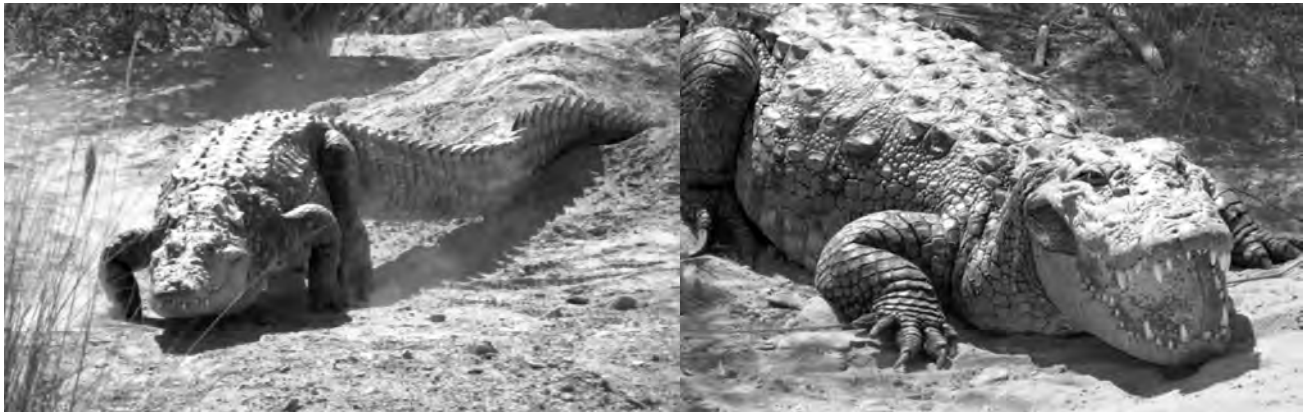
If your child is interested in understanding nature through

- i) Nature Photography
- ii) Wild Detectives online course
- iii) Learning expeditions
- iv) Nature through mobile and others planned.

Contact: 9952243541



Large tanker lorries to reduce human-crocodile interactions in southeastern Iran



A Mugger *Crocodylus palustris* in Gandou Protected Area, Sistan & Baluchistan Province, southeastern Iran. © Mohammadreza Hosseyni.

The Mugger Crocodile *Crocodylus palustris* Lesson 1831 is a medium-sized species native to India, Iran, Nepal, Pakistan and Sri Lanka (Mobaraki et al. 2013), and classed as ‘Vulnerable’ (Choudhury & de Silva 2013). This species, however, is listed as ‘Endangered’ in Iran (Mobaraki 2015). Iran is the westernmost global range of the species distribution (Abtin 2012), and a small population (around 344 individuals in the wild) (Young Journalists Club 2019) occurs in the Bahukalat Protected Area (BPA) at Chabahar County (near Gwater at the Pakistani border) in the Sistan & Baluchistan Province (Firouz 2005; Mobaraki et al. 2013). Since the BPA is the only distribution area for the species in Iran, Iran’s Department of Environment (DoE) decided to change the name of the BPA to ‘Gandou Protected Area’ (GPA) on 12 September 1982 (Pars

Vista Adviser Engineers Technical Report 1995) as “gandou” is the local name for the Crocodiles (DoE Technical Report 2005). The GPA is 3,825km² (DoE Technical Report 2007), and contains rivers including the Bahukalat, Kaju and Sarbaz (DoE Technical Report 2005), lakes, marshes, reservoirs, irrigation canals and manmade ponds adjacent to villages (Mobaraki et al. 2013).

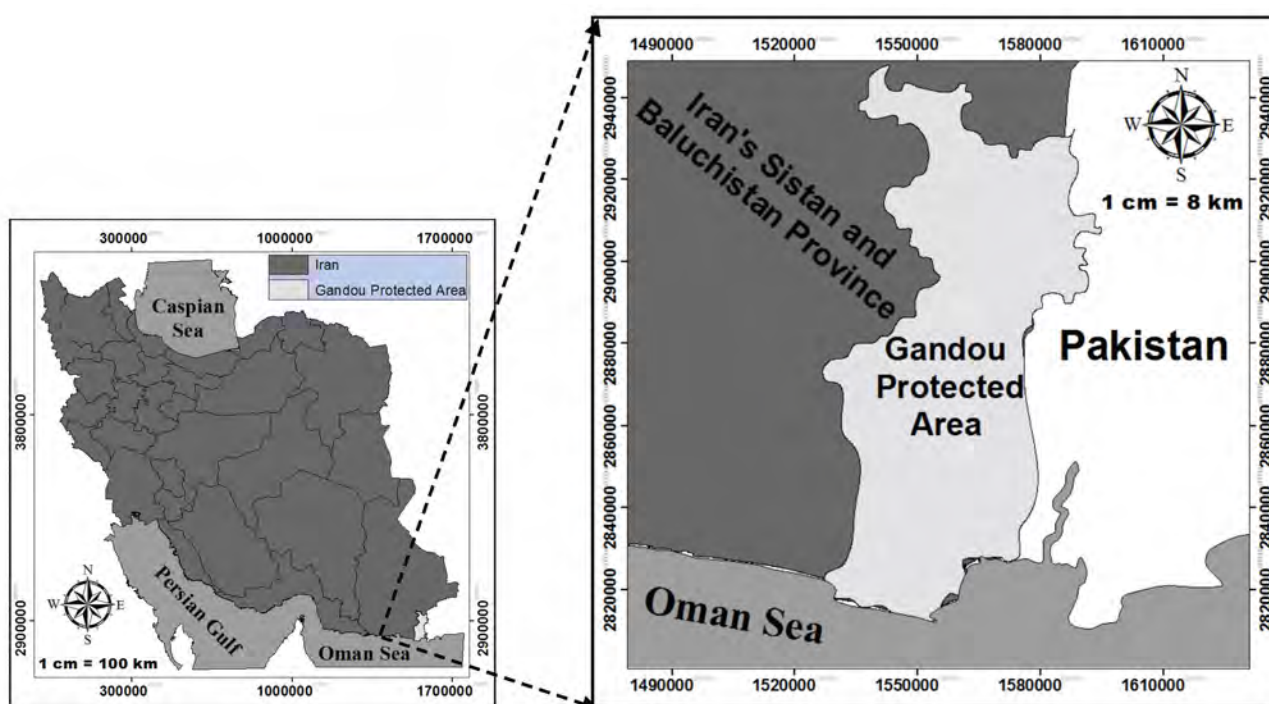
The Mugger is one of the least studied animal species in Iran. According to the DoE officials, prolonged drought has had a significant impact on its population (Hamshahri Online 2019) as Gandou’s distribution is completely dependent on water resources and water availability (Mobaraki 2015). Lack of rain, water shortage, prolonged drought and human population growth in southeastern Iran have caused the local people to overuse

the remaining water in the ponds for the purposes of daily use and agriculture activities, leading to the Mugger's habitat loss, degradation and destruction (Pars Vista Adviser Engineers Technical Report 1995), and also increasing human-mugger negative interactions that have resulted in loss of human lives (Iran Environment & Wildlife Watch 2016) and the amputation of human body parts (Mehr News Agency 2019).

Habitat loss, degradation and destruction make the Muggers leave drying ponds and migrate to other ponds (Mobaraki et al. 2013; Mobaraki 2015). The Gandou's powerful hind limbs enable it to tolerate its weight when travelling long distances across the land at night (Mobaraki 2015), and while resting in the shade during the day (DoE Technical Report, 2005). During their land trips, the Gandous are likely to

fall down deep holes from which they cannot climb up again, dying as a result.

The Muggers are mainly dependent on fish (Mobaraki 2015). There have been several official reports confirming the Muggers entering cities and villages in southeastern Iran to gain food (Iran Environment and Wildlife Watch 2013; Radio Farda 2019). It seems that all the above mentioned issues (i.e., lack of rain, water shortage, prolonged drought and human population growth) have caused lack of wild prey sufficiency which makes them attack the local communities' livestock to gain food and this certainly increases human-mugger interactions (DoE Technical Report 2005; Mobaraki 2015). The other problem that afflicts the Gandou population is collision with passing vehicles while crossing roads at night (DoE Technical Report



Gandou Protected Area, Sistan & Baluchistan Province, southeastern Iran (created by Jamshid Parchizadeh).



2005; Mobaraki 2015). Car collisions with Crocodiles in different stages of life and leading to their deaths have been recorded several times (Mobaraki & Abtin 2007). According to the DoE, around 8–10 Muggers are killed on roads annually but the media does not receive the news mainly because the GPA is located very far away in the country (Khabbaz 2015).

The Mugger is the only member of the order *Crocodylia* and also the largest reptile in Iran (DoE 2018). There is little reliable information on the Mugger in the GPA (Mobaraki et al. 2013). Lack of water is a very critical concern for the area (Mobaraki 2015).

I, therefore, recommend that the Iranian government, especially the DoE, provide the local people in the GPA with sufficient quantity of water in order to reduce human-mugger interactions and also to improve the status of the species. The best way to approach this issue is to use large tanker lorries that can transport water to faraway areas. In this way, the Mugger habitats which are completely dependent on water can be saved. I hope that the Iranian government takes steps before it is too late.

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A leucistic Northern Palm Squirrel from Dehradun, India



A leucistic Northern Palm Squirrel *Funambulus pennantii* from Dehradun, northern India.

The Northern Palm Squirrel or the Five-striped Squirrel *Funambulus pennantii* Wroughton, 1905 is a common squirrel in northern India. This species is characterised by five light coloured stripes on the back; three median pale stripes flanked on each side with a supplementary pale stripe; the dorsal pelage ranges from greyish-brown to almost black, while the head is usually greyish to reddish-brown; the tail alone makes up about half of the total body length; the head and body length ranges 13–16 cm and tail length 14–16 cm (Alfred et al. 2006; Menon 2014). In India, it is distributed in central, northern and northeastern regions, Andhra Pradesh and Karnataka, and elsewhere in Bangladesh,

Iran, Nepal and Pakistan (Molur et al. 2005; Wilson & Reeder 2005). It is gregarious, mostly arboreal living with up to 10 other individuals in the same tree; herbivorous and omnivorous in diet; feed on seeds, nuts, buds, young bark, leaves, insects, flowers and grubs; its habitats include grasslands, scrublands, plantations and tropical to subtropical dry deciduous forests (Molur et al. 2005; Nameer & Molur 2016).

Recently, one of the authors (MK) sighted a white Palm Squirrel at the IIRS campus, near the Golden Jubilee hostel, IIRS, Dehradun, Uttarakhand, India (30.340°N & 78.046°E, altitude 702m; on 01 July 2019).



The squirrel was identified as a leucistic Northern Palm Squirrel based on the visible characters such as the body was completely white from head to tail with pinkish snout, normal eyes (black colour) and very pale stripes on its dorsal pelage.

Leucism is defined as a complete lack of pigmentation in the entire body and showing whitish hair and pale skin but eyes are normal in colour. This happens due to an inherited defect in the pigment transfer process (van Grouw 2006; Lucati & Lopez-Baucells 2016; Mahabal 2019). Recently, Mahabal et al. (2019) reported the records of various types of coloured aberrations of 56 species of Indian mammals including *Funambulus pennantii*. Leucism in *F.*

pennantii have previously been reported from Kolkata, West Bengal (Agrawal & Chakraborty 1979), and Satara District, Maharashtra (Sayyed & Mahabal 2016); recently from Ghazipur District, Uttar Pradesh (Yadav 2019) and few albinism records from Chandigarh (Chaturvedi & Ghose 1984), Udaipur City, Rajasthan (Sharma 2004), Sindhudurg District, Maharashtra (Mahabal et al. 2005), northern Udaipur, Rajasthan (Mehra et al. 2007, 2010), and Kutch, Gujarat (Newnham 1886). Dehradun is the capital city of Uttarakhand state in northern India and is located in the Doon Valley on the foothills of the Himalaya and is geographically different from other areas.



The red mark indicates the observation of leucistic Northern Palm Squirrel *Funambulus pennantii* from Dehradun (Source: Bhuvan portal).

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A note on feeding behaviour of Stripe-necked Mongoose from southern Western Ghats



Stripe-necked Mongoose *Herpestes vitticollis* at Periyar Tiger Reserve. © M.S. Syamili.

The Stripe-necked Mongoose *Herpestes vitticollis* is the largest Asiatic Mongoose (Mudappa 2013). *H.v. vitticollis* is one of the subspecies seen in the Western Ghats of Coorg, Anamalai, and Kerala. It has an orangish-red tint on the body (Gilchrist et al. 2009). It mostly occurs in deciduous (dry & moist) and evergreen forests and prefer habitats near streams and rivers (Menon 2014). It has been reported from Periyar Tiger Reserve, Biligiri Rangaswamy Temple Tiger Reserve, Parambikulam Tiger Reserve, Eravikulam National Park, Wayanad Wildlife Sanctuary, and Silent Valley National Park (Ramachandran 1985; Kumara et al. 2014; Sreehari & Nameer 2016; Nikhil & Nameer 2017; Sanghamithra

& Nameer 2018; Sreekumar & Nameer 2018). They are diurnal solitary herpestines and are known to feed on crabs, small mammals, birds, bird eggs, reptiles, and insects (Prater 1971). In Sri Lanka, they are found to hunt small mammals such as Mouse Deer *Moschiola meminna* and Black-naped Hare *Lepus nigricollis*. This mongoose is also found scavenging on Sambar *Rusa unicolor* and Indian Hare *Lepus nigricollis* (Gilchrist et al. 2009). Detailed ecological or behavioural studies on this diurnal mongoose in southern Asia is mostly absent.

On 26 January 2019 at 07.45h, during the course of a bird survey at Periyar Tiger



Reserve (near Manakkavala), we observed an interesting behaviour by a Stripe-necked Mongoose, which was found feeding on invertebrates, including beetles and grubs, from among the fresh dung piles of Asian Elephants. The animal spent 10–15 minutes searching and feeding on invertebrates from the dung piles. The whole episode was video graphed ([Video 1](#)). We noticed the same behaviour the next day too at a different site near Manakkavala.

There is a report on the feeding of the invertebrates from the African Elephant dung by the White-tailed Mongoose *Ichneumia albicauda* in Africa (Gilchrist et al. 2009). This is the first report of such a behaviour in any Indian Mongoose.

The present observation underscores the significance of detailed studies on the biology and ecology of small carnivores, including the mongoose, which in turn will be useful for the long-term conservation of these lesser-known taxa in the biodiversity hotspot, the Western Ghats.

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Butterflies of MACFAST Campus, Thiruvalla, Pathanamthitta District, Kerala, India

Butterflies are very sensitive to the changes in the environment and are considered good ecological indicators; hence they are included in various conservation and biodiversity studies (Gadgil 1996). Butterflies are valuable pollinators and form an important part of the food chain components of reptiles, birds, and other predatory insects. Butterflies are diurnal creatures but some are active at night also. Approximately, 18,000 species of butterflies have been recorded from around the world. Of them, 1,501 species are from India, 334 species from the Western Ghats (Evans 1932; Gaonkar 1996; Kunte 2000) and 316 from Kerala (Palot et al., 2012). Some of the earlier works, which enriched the butterfly studies in Kerala include Ferguson (1891) who recorded 220 butterfly species from Travancore area, Mathew & Rahmathulla (1993) recorded 100 species from Silent Valley National Park, 119 species from Periyar Tiger Reserve (Palot et al., 1997), 124 species from Parambikulam Wildlife Sanctuary (Sudheendrakumar et al., 2000), and 71 species from Aralam Wildlife Sanctuary (Sreekumar & Balakrishnan, 2001). Fire, illegal trading of butterflies, overuse of pesticides and weedicides, road kills, habitat destruction, may negatively

impact butterfly species. Diversity studies from representative habitats will give an outline of the ecological system of that area.

The butterfly fauna of the MACFAST college campus, Thiruvalla, Pathanamthitta district was monitored once a week from June 2017 to August 2018. The butterfly species were photo documented and species identification was done with the help of field guides by Mathew (2014), Kunte (2000), and the website of Butterflies of India (Kunte 2018).

The present study on butterfly diversity was carried out in the campus of Mar Athanasios College for Advanced Studies (MACFAST) (9.3730°N & 76.584°E from June 2017 to August 2018. The MACFAST campus is located about three kilometers south of Thiruvalla Town. The total area of the campus is about 7.5 acres, and the vegetation is dominated by *Anacardium occidentale*, *Racosperma auriculiforme*, *Racosperma mangium*, *Artocarpus heterophyllus*, *Artocarpus hirsutus*, *Mangifera indica*, *Bamboo* sp., *Cocos nucifera*, *Corypha umbraculifera*, *Lagerstroemia microcarpa*, *Nephelium*

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Table. Checklist of butterflies of MACFAST Campus, Thiruvalla, Kerala.

	Common name	Scientific name
Papilionidae: Papilioninae		
1	Sahyadri Birdwing	<i>Troides minos</i>
2	Common Rose	<i>Pachliopta aristolochiae</i>
3	Crimson Rose	<i>Pachliopta hector</i>
4	Common Bluebottle	<i>Graphium sarpedon</i>
5	Tailed Jay	<i>Graphium agamemnon</i>
6	Lime Swallowtail	<i>Papilio demoleus</i>
7	Red Helen	<i>Papilio helenus</i>
8	Common Mormon	<i>Papilio polytes</i>
9	Common Mime	<i>Papilio clytia</i>
10	Blue Mormon	<i>Papilio polymnestor</i>
Pieridae: Coliadinae		
11	Lemon Emigrant	<i>Catopsilia pomona</i>
12	Mottled Emigrant	<i>Catopsilia pyranthe</i>
13	Small Grass Yellow	<i>Eurema brigitta</i>
14	Spotless Grass Yellow	<i>Eurema laeta</i>
15	Common Grass Yellow	<i>Eurema hecabe</i>
16	Three-spot Grass Yellow	<i>Eurema blanda</i>
Pieridae: Pierinae		
17	Indian Jezebel	<i>Delias eucharis</i>
18	Pioneer	<i>Belenois aurota</i>
19	Psyche	<i>Leptosia nina</i>
20	Common Gull	<i>Cepora nerissa</i>
21	Chocolate Albatross	<i>Appiaslyncida</i>
Nymphalidae: Satyrinae		
22	Common Evening Brown	<i>Melanitis leda</i>
23	Tailed Palmfly	<i>Elymnias caudata</i>
24	Bamboo Treebrown	<i>Lethe europa</i>
25	Common Bushbrown	<i>Mycalesis perseus</i>
26	Dark-branded Bushbrown	<i>Mycalesis mineus</i>
27	Long-branded Bushbrown	<i>Mycalesis visala</i>
28	Common Four-ring	<i>Ypthima huebneri</i>
29	Common Five-ring	<i>Ypthima baldus</i>

	Common name	Scientific name
Nymphalidae: Heliconiinae		
30	Tawny Coster	<i>Acraea terpsicore</i>
31	Cruiser	<i>Vindula erota</i>
32	Rustic	<i>Cupha erymanthis</i>
33	Common Leopard	<i>Phalanta phalantha</i>
34	Tamil Yeoman	<i>Cirrochroa thais</i>
Nymphalidae: Limenitidinae		
35	Common Sailer	<i>Neptis hylas</i>
36	Commander	<i>Moduza procris</i>
37	Grey Count	<i>Tanaecia lepidea</i>
38	Baron	<i>Euthalia aconthea</i>
Nymphalidae: Biblidinae		
39	Angled Castor	<i>Ariadne ariadne</i>
40	Common Castor	<i>Ariadne merione</i>
Nymphalidae: Nymphalinae		
41	Yellow Pansy	<i>Junonia hierta</i>
42	Lemon Pansy	<i>Junonia lemonias</i>
43	Peacock Pansy	<i>Junonia almanac</i>
44	Grey Pansy	<i>Junonia atlites</i>
45	Chocolate Pansy	<i>Junonia iphita</i>
46	Danaid Eggfly	<i>Hypolimnas misippus</i>
47	Great Eggfly	<i>Hypolimnas bolina</i>
Nymphalidae: Danainae		
48	Glassy Tiger	<i>Parantica aglea</i>
49	Blue Tiger	<i>Tirumala limniace</i>
50	Dark Blue Tiger	<i>Tirumala septentrionis</i>
51	Plain Tiger	<i>Danaus chrysippus</i>
52	Striped Tiger	<i>Danaus genutia</i>
53	Common Crow	<i>Euploea core</i>
Lycaenidae: Polyommatainae		
54	Common Pierrot	<i>Castalius rosimon</i>
55	Banded Blue Pierrot	<i>Discolampa ethion</i>
56	Plains Cupid	<i>Chilades pandava</i>
57	Tiny Grass Blue	<i>Zizula hylax</i>

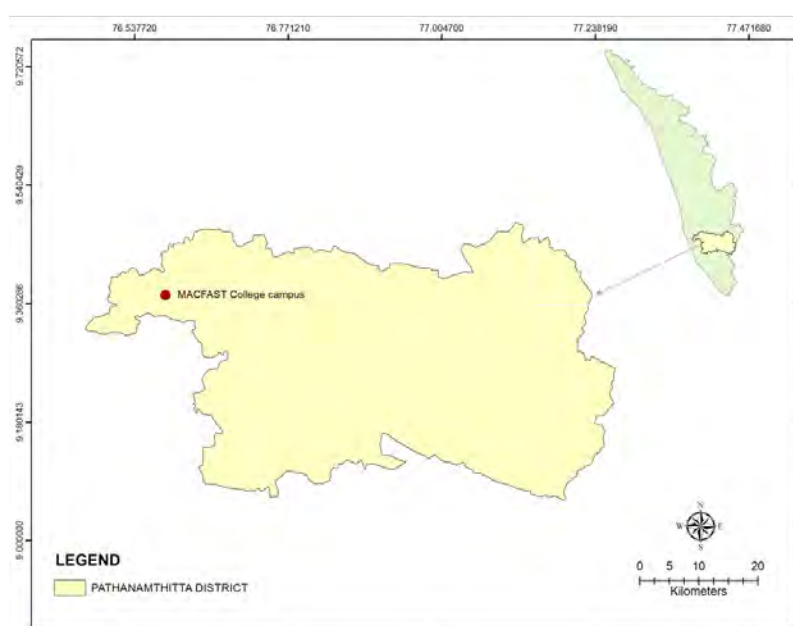
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	Common name	Scientific name
58	Lime Blue	<i>Chilades lajus</i>
59	Gram Blue	<i>Euchrysops cnejus</i>
60	Common Cerulean	<i>Jamides celeno</i>
61	Red Pierrot	<i>Talicauda nyseus</i>
Lycaenidae: Theclinae		
62	Slate Flash	<i>Rapala manea</i>
63	Monkey Puzzle	<i>Rathinda amor</i>
Hesperiidae: Pyrginae		
64	Common Snow Flat	<i>Tagiades japetus</i>
65	Water Snow Flat	<i>Tagiades litigiosa</i>
66	Tricolour Pied Flat	<i>Coladenia indrani</i>
67	Suffused Snow Flat	<i>Tagiades gana</i>
Hesperiidae: Hesperinae		
68	Bush Hopper	<i>Ampittia dioscorides</i>
69	Chestnut Bob	<i>Iambrix salsala</i>
70	Common Branded Redeye	<i>Matapa aria</i>
71	Grey-veined Grass Dart	<i>Taractrocera maevius</i>
72	Smaller Dartlet	<i>Oriens goloides</i>
73	Oriental Palm Bob	<i>Suastus gremius</i>
74	Pelopidas swift species	<i>Pelopidas</i> sp.
75	Parnara Swift species	<i>Parnara</i> sp.

lappaceum, *Ficus auriculata*, *Flacourtia jangomas*, *Azadirachta indica*, *Carica papaya*, *Cassia fistula*, *Syzygium jambos*, *Phyllanthus emblica*, *Sapindus emarginatus*, *Tectona grandis*, *Macaranga indica*, *Bauhinia racemosa*, *Averrhoa carambola*, *Albizia chinensis*, *Delonix regia*, *Muntingia calabura*, *Elaeocarpus serratus*, *Manilkara zapota* and *Artocarpus incises*. Aquatic weeds like *Eichhornia crassipes*, *Salvinia molesta* were also present in water bodies near paddy fields.

A total of 75 species from 52 genera of butterflies belonging to five families and 13 subfamilies were identified from MACFAST Campus, including one species which is endemic to the Western Ghats and 10 species protected under various schedules of the Indian Wildlife (Protection)

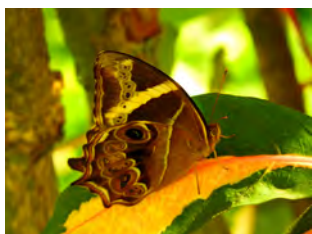


MACFAST Campus, Thiruvalla.

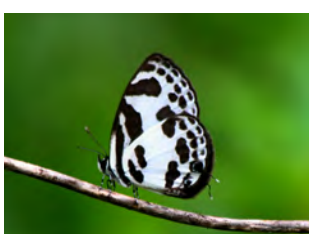
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Photographs of butterflies recorded in the MACFAST Campus.



Bamboo Treebrown



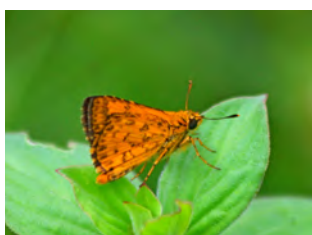
Banded Blue Pierrot



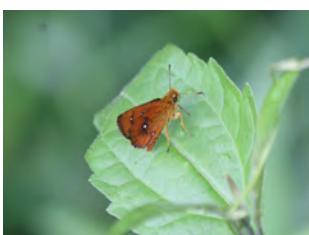
Chocolate Albatross



Common Bluebottle



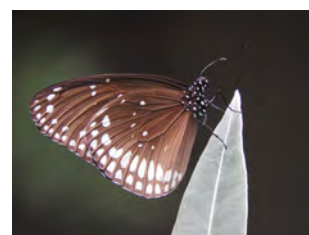
Bush Hopper



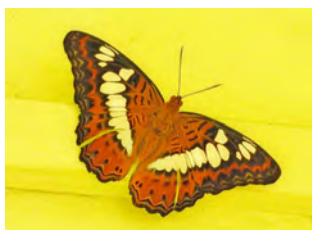
Chestnut Bob



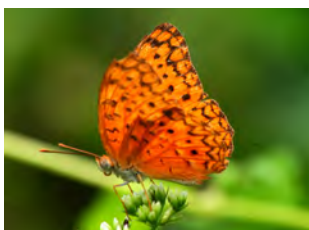
Chocolate Pansy



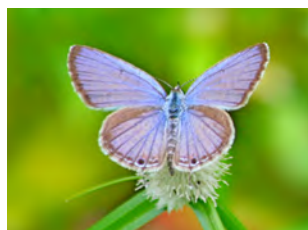
Common Crow



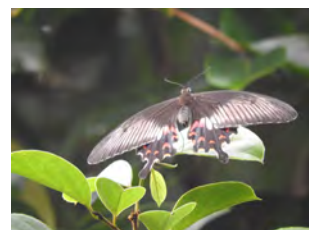
Commander



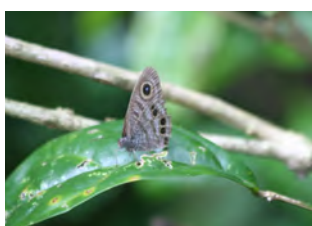
Common Leopard



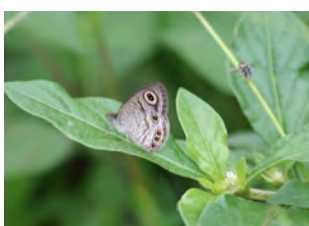
Common Cerulean



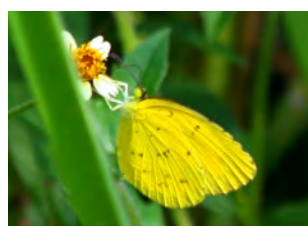
**Common Mormon
(female)**



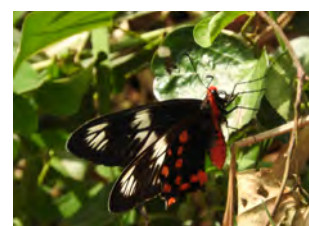
Common Five-ring



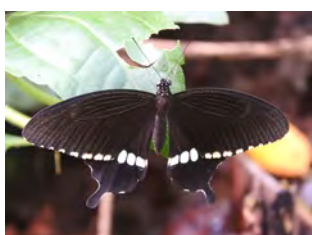
Common Four-ring



Common Grass Yellow



Crimson Rose



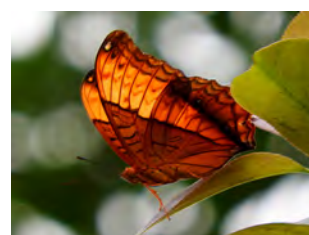
**Common Mormon
(male)**



Common Pierrot



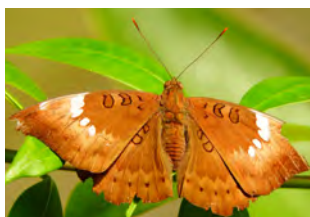
Common Sailer



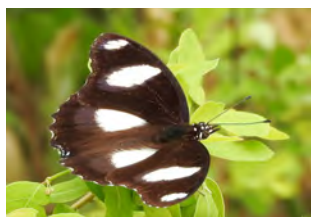
Cruiser

Bugs R All

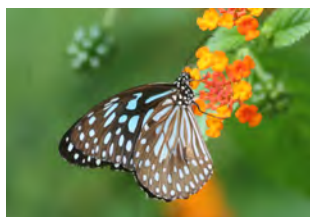
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Baron



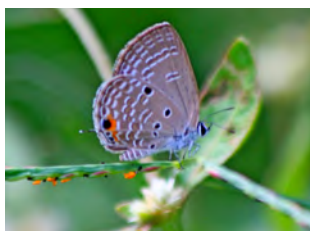
Danaid Eggfly



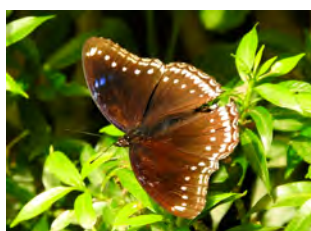
Dark Blue Tiger



**Dark-banded
Bushbrown**



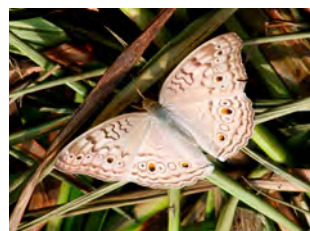
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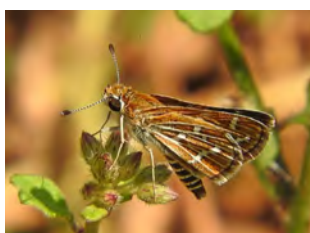
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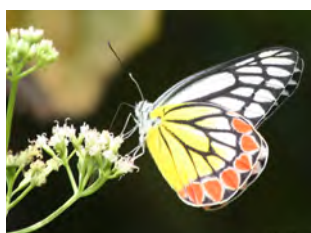
Grey Count



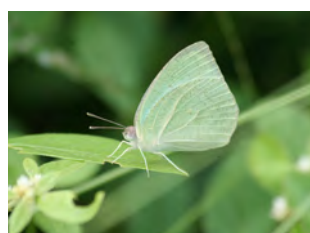
Grey Pansy



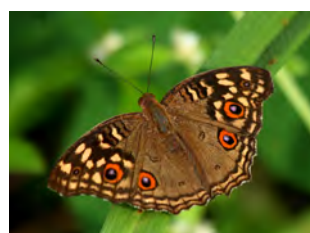
Grey-veined Grass Dart



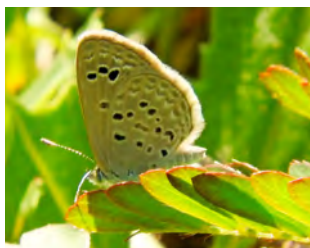
Indian Jezebel



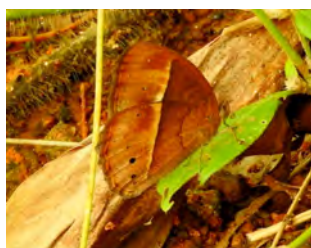
Lemon Emigrant



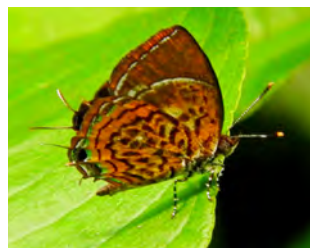
Lemon Pansy



Lime Blue



**Long-branded
Bushbrown**



Monkey Puzzle



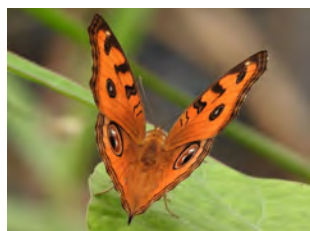
Pioneer



Mottled Emigrant



Oriental Palm Bob



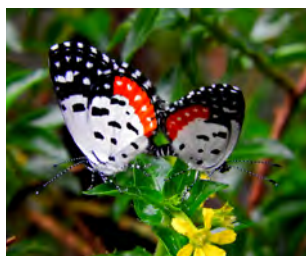
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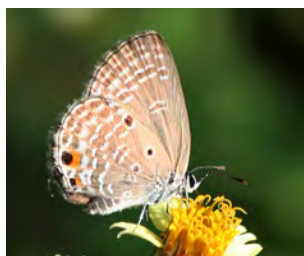
Plain Tiger

Bugs & All

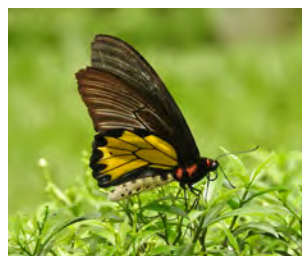
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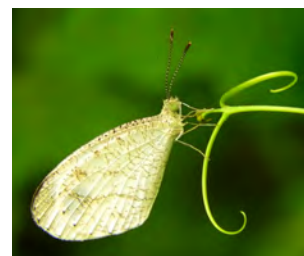
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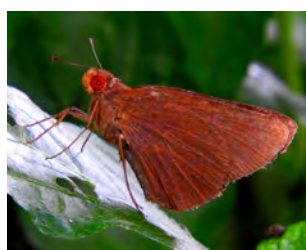
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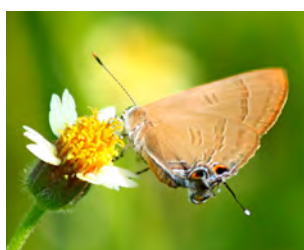
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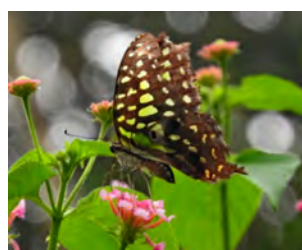
Psyche



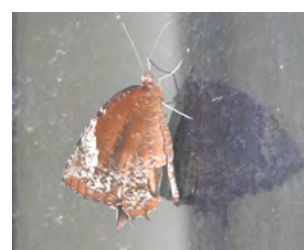
Common Branded Redeye



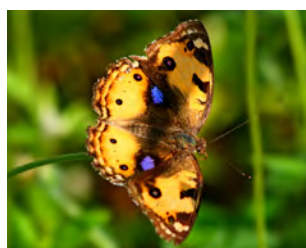
Slate Flash



Tailed Jay



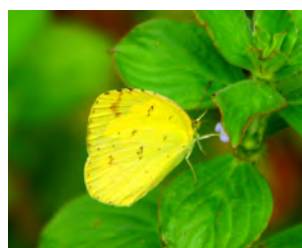
Tailed Palmfly



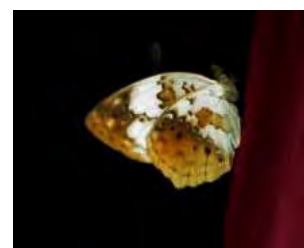
Yellow Pansy



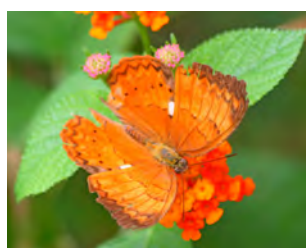
Tawny Coster



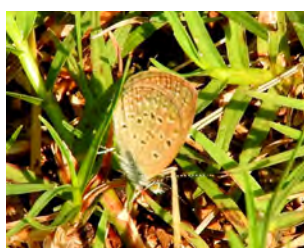
Three-spot Grass Yellow



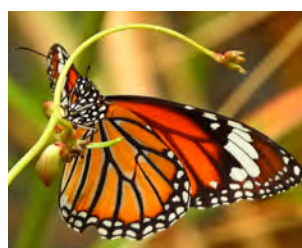
Rustic



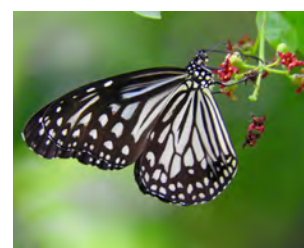
Tamil Yeoman



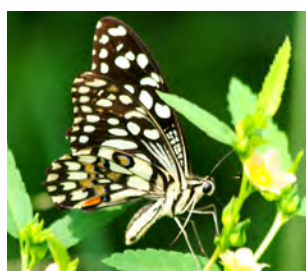
Tiny Grass Blue



Striped Tiger



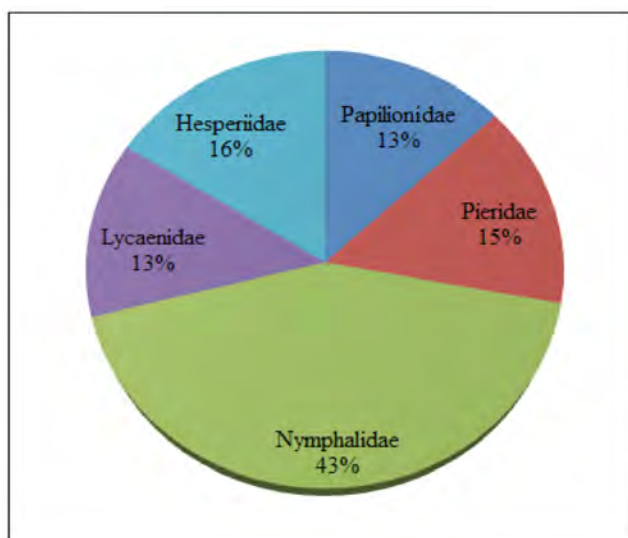
Glassy Tiger



Lime Swallowtail

Bugs R' All

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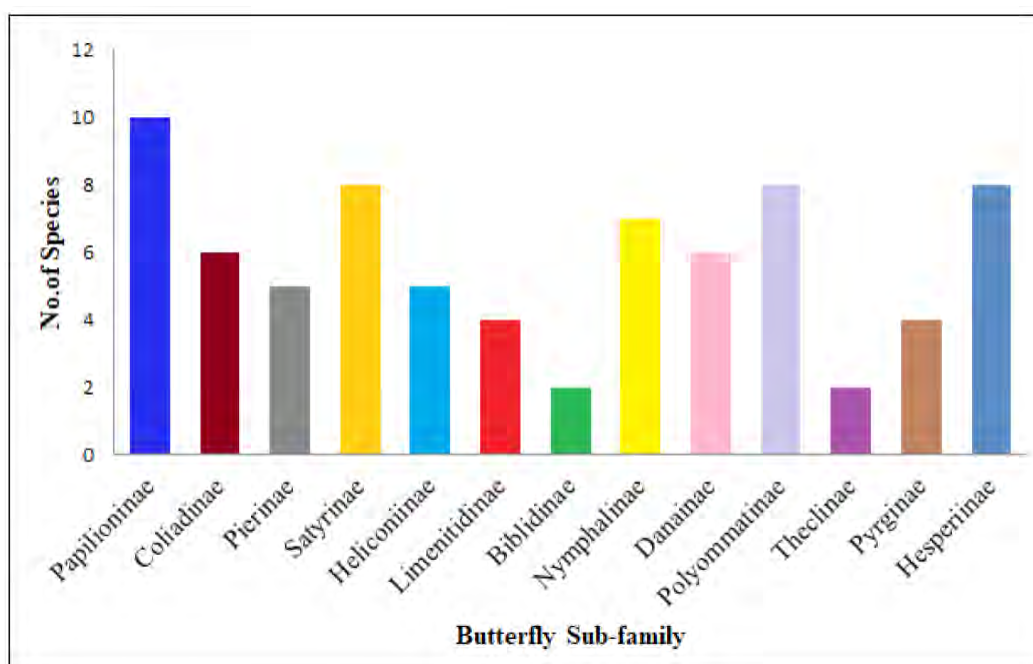


Family wise distribution of butterfly species in MACFAST campus.

Act, 1972. The sighted butterflies are listed in Table. Nymphalidae (brush-footed butterflies) were the most dominant family comprising of 32 species belonging to five subfamilies and it constituted 42.7% of the

total butterfly species in the campus. The subfamily-wise distribution of butterflies of MACFAST campus is given.

Out of 316 species recorded from Kerala, 75 species are recorded from the MACFAST campus, which implies that the small green campus is rich in butterfly diversity. Among the 75 species, *Pachliopta hector*, *Papilio clytia*, *Lethe europa*, *Castalius rosimon* are listed in the Schedule I of the Indian Wildlife (Protection) Act of 1972. Species such as *Euchrysops cnejus*, *Hypolimnys misippus*, *Tanaecia lepidea*, *Cepora nerissa*, *Appias lyncida* are in Schedule II and *Euploea core* is under Schedule IV as per the Act. Sahyadri Birdwing *Troides minos*, an endemic species to the Western Ghats was also recorded from the campus. Six migratory



Sub-family wise distribution of butterfly species in MACFAST campus.

Bugs R All

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butterfly species namely *Euploea core*, *Danaus chrysippus*, *Tirumalalimniace*, *Catopsilia pyranthe*, *Catopsilia*, *Pomona*, and *Papilio demoleus*, have also been recorded on this campus.

While comparing with the butterfly diversity of well-established butterfly gardens like Nilambur Butterfly Garden (with 50 species) (Revathy & Mathew 2013) and Thumboormuzhi river garden (with 89 species) (Puthur et al. 2015), MACFAST campus, without a butterfly garden, exemplifies a potential habitat for the butterflies. This small urban landscape is an abode to 5% and 23.73% of the total butterfly species of India and Kerala respectively. As there is an urgent need for conservation programmes, setting up of a butterfly garden by planting more nectar plants and larval food plants is the main recommendation for the conservation of butterflies on the campus.

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Scope of using surveillance cameras for studying nesting ecology of colonial waterbirds: Painted Storks in National Zoo, Delhi

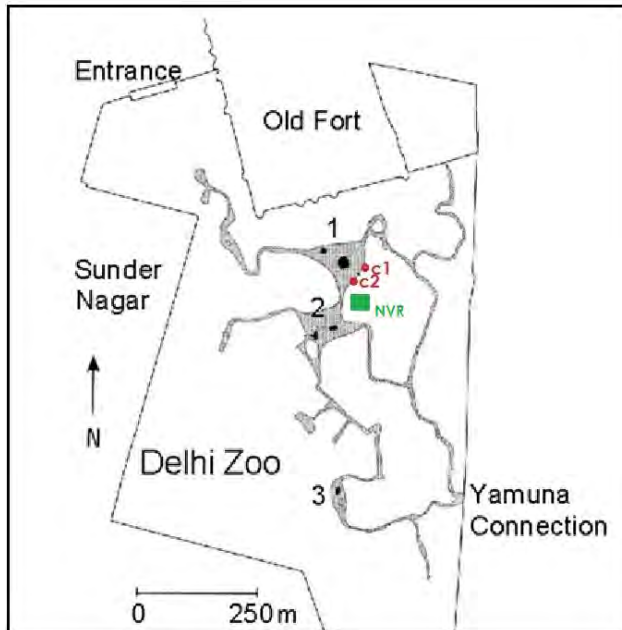


One of the two surveillance cameras installed in the Delhi Zoo in Pond 1 of the zoo. © A J Urfi.

The usage of camera methods for population census, studying behaviour by surveillance or camera traps is becoming common place in wildlife biology studies. Worldwide camera techniques have been used by several investigators in bird studies, some examples of which, through a casual literature search on the internet, are provided in Table 1. A number of different species have been studied and the objectives of the studies undertaken have been to determine the nest fate, nest predators and predation events,

parental behavior, diet and feeding pattern of nesting birds, etc. In addition, some papers have provided a general discussion of camera methods. In India, while camera methods have been used for studying many species of wildlife, particularly big cats and some other mammal species, no proper study seems to have been undertaken yet on birds.

We explored the possibility of using surveillance cameras for studying the nesting ecology of colonial waterbirds. For this purpose, a study was initiated



Map of the Delhi Zoo showing the location of cameras and NVR near pond 1.

in September 2019 on the free-ranging Painted Stork *Mycteria leucocephala* which regularly nests in the premises of the National Zoological Park, Delhi. A report of the camera setup and related equipment is presented here.

Studying nesting success of colonial waterbirds: general considerations

The modern method to estimate one important parameter of nesting birds, i.e., nest success is usually modeled by using the program Mark (Rotella 2005; Tiwary & Urfi 2016). This information is vital for conservation and monitoring purposes. The method involves repeated visits to marked nests to record nest fate: active (0) or failed (1). Along with a series of covariates, by using Mark it is possible to model nest success in the context of all

the relevant parameters which may have a bearing on nest survival. The time interval between successive visits to the nest is an important consideration. For instance, if the interval between two visits is very long, the confidence of the final nest success estimate is likely to be gross because a lot may have happened in the intervening days about which the investigator has no clue. Therefore, if there is a system in place, say constant surveillance through camera recording, then the time interval can be altered at will.

Secondly and importantly, the factors leading to nest loss between two successive intervals when the investigator is not present are impossible to know in most cases. They could be a natural predator, a human disturbance related



A close up of the recording device. © A J Urfi.

Table 1. A summary of some recent examples of studies on birds in which camera methods have been employed.

Objectives	Place	Species	Reference
Monitoring predation events at nests	UK	Lapwing <i>Vanellus vanellus</i> Spotted Flycatchers <i>Muscica pastrata</i>	Bolton et al. 2007
Monitoring of nesting success	Hawaii USA	Hawaiian Honeycreeper <i>Magnuma parva</i> Monarch Flycatcher <i>Chasiempis sclateri</i> Japanese White-eye <i>Zosterops japonicus</i>	Hammond et.al. 2016
To assess the timings of nest predation by video surveillance method	USA	Acadian Flycatchers <i>Empidonax virescens</i> Indigo Buntings <i>Passerina cyanea</i>	Gill et al. 2016
General article regarding the use of small video camera device	USA	Several species	Ouchley et al. 1994
The application of a robotic camera system (Gigapan) which takes a tiled sequence of photographs which are automatically stitched together to form high-resolution panoramas	Australia	Shy albatross <i>Thalassarche cauta</i>	Lynch et al. 2015
To determine the effect of parental behavior on nesting success using video surveillance	USA	Painted Buntings <i>Passerina ciris</i>	Vasseur & Leberg 2016
Evaluation of trail-cameras for analyzing the diet of nesting raptors	Spain	Northern Goshawk <i>Accipiter gentilis</i>	Salgado et al. 2016
To evaluate nest success and nest predator dynamics	USA	Sharp-tailed Grouse <i>Tympanuchus phasianellus</i>	Burr et al. 2017
To evaluate the effect of off road vehicles on nesting behaviour as well as the reproductive success using video cameras	USA	American Oystercatchers <i>Haematopus palliatus</i>	Borneman et al. 2016
Effects of created forest edges on nest predators and interaction of these predators with forest birds	Thailand	Multiple species of forest birds	Khamcha et al. 2018
To determine nest fates and causes of nest failure	USA	Least Terns <i>Sternula antillarum</i> Piping Plovers <i>Charadrius melodus</i>	Andes et al. 2019

Objectives	Place	Species	Reference
A protocol that utilizes a minimally invasive surveillance system to continuously monitor breeding colonies of Common terns	USA	Common Terns <i>Sterna hirundo</i> Short-tailed Shearwaters <i>Puffinus tenuirostris</i> Common Eiders <i>Somateria mollissima</i> Black Skimmers <i>Rynchops niger</i> Fiordland Crested Penguins <i>Eudyptes pachyrhynchus</i>	Wall et al. 2018
A simple, inexpensive video camera setup for the study of avian nest activity	USA	American Oystercatchers <i>Haematopus palliatus</i>	Sabine et al. 2005
To document and quantify the breeding season, record behavior associated with feeding at nests	USA	Northern Goshawk <i>Accipiter gentilis</i>	Lewis et al. 2004
The aim of this study was to quantify the efficiency of camera traps in a wildlife crossing evaluation.	France	Wild animals	Jonathan et al. 2017

event or something else. This problem can also be solved by camera recording methods.

In an earlier study on the Painted Stork population at the Delhi Zoo (Tiwary & Urfi 2016), we studied nesting success using observational methods which involved visitation to the nesting colonies at regular intervals of 2–3 days. While this method gives reasonable results, it has one major drawback, i.e., it is impossible to know the causes of nest loss and interactions between the individuals of Painted Stork in a colony unless they are recorded accidentally viz. during the course of a field visit if there is a chance of observation of predation on the nest. Here, camera recording methods can be extremely useful.

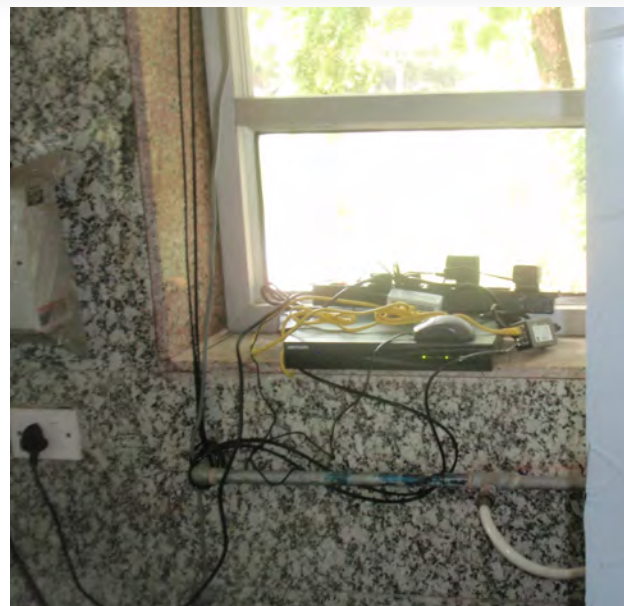
Study area

The Delhi Zoo heronries have been described in detail by Urfi (2011) and Tiwary & Urfi (2016). How the Delhi Zoo accidentally became a nesting ground for free-ranging colonial waterbirds, especially the Painted Stork since 1960 has also been well documented (see the box in Urfi 2019).

The site has two interconnected ponds (1 & 2) with each having two islands (0.8ha each) planted with *Prosopis juliflora* trees. The merged canopies of these trees are utilized for nesting by eight species of colonial waterbirds at different times of the year besides the Painted Stork.

Each year after the monsoon rains, the Painted Storks start congregating in the

two ponds where they contest territories and commence nesting by September. On an average, approximately 400 birds arrive each year (the number of immigrant potential nesters varying in relation to the monsoonal rainfall that year). The nesting continues from January up to March of the succeeding year after which all the storks leave the zoo premises and do not return till August/September. In the intervening period, where exactly the birds remain is not clearly known but most likely they remain widely scattered in the surrounding countryside looking for food at wetlands. The Delhi Zoo population offers an excellent opportunity for experimenting with various study techniques like using cameras in the present study because of the ease with which the free-ranging Painted Stork can be studied.



The NVR unit installed in the water cooler room from where cables approximately 20-26 feet in length connect to the two cameras outside. © A J Urfi.

Camera setup and related equipment in the present study

In September 2019, two cameras were set up in pond 1. The placement of the cameras and the CPU. The specifications

Table 2. Specification and placement of cameras to record the nesting of Painted Storks in the National Zoological Park (Delhi Zoo) in 2019.

Units	Specifications	Comments
Cameras HIKVISION FIXER IR BULLET Network Camera, Model no. DS-2CD122P-I3 4mm	HD video (High-Definition) EXIR (Extended InfraRed) IP67 (International Protection) PoE Optional (Power over Ethernet)	Mounted on iron pillars at a height of approximately 10-12ft. Camera 1, Recording distance 25-27ft. approx No. of nests under observation 11 (8.3%) Camera 2, Recording distance 48-50ft. approx no. of nests under observation 22(16.5%)
NVR (Network Video Recorder) HIKVISION DS 7600 series Embedded NVR CPU Model no. DS-7P04NI-Q1	HD video stream input Third-party network camera supported HDMI/VGA HD output(High-definition multimedia interface/ Video Graphics Array) EZVIZ Cloud P2P function Gigabit NIC (Network Interface Controller)	Kept inside the room which houses the water coolers. The room has a continuous power supply.



Photo of the monitor displaying the view from the cameras. © Paritosh Ahmed.

of the Network Video Recorder (NVR) and cameras are given in Table 2. The visual output from which relevant data can be obtained. Together, the two cameras recording from a distance of 7.5–15 m mounted on top of iron columns approximately 3m high, had in view 33 nests. Out of 133 active nests in pond 1 colonies in the month of September, this accounted for 24% of the nests.

General Discussion

By September 2019, nesting activity had commenced in both the ponds and 133 nests were counted in pond 1. The nests under surveillance were a small fraction of all the nests built (Table 2). It is hoped to carry the study until November 2019 and analyse the data with respect to intra and interspecific interactions, colony attendance during day and night hours, and causes of nest failure.

The advantages and disadvantages of using camera methods are obvious. The surveillance cameras make a continuous recording and all important events are recorded. The investigator has all the relevant data on his laptop for detailed analysis at leisure (Demers & Robinson-Nilsen 2012; Brandis et al. 2014; Jumeau et al. 2017). At the same time, the disadvantages of these technologies are primarily the high costs involved in purchase and estimation. Therefore, only a limited number of functional units can be installed in the field. Storage of the data is also an issue and if the study has to be carried out for the entire duration of nesting period, which may be several months, then it has to be factored in at the planning stage itself.

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Extended distribution of a rare orchid *Cheirostylis parvifolia* from northern Western Ghats of Maharashtra, India



Cheirostylis parvifolia Lindl. a—Habit in humus and side view of flower | b—Rhizomes creeping on rock surface | c—Exposed lip with anthers without sepals and petals | d—Exposed anthers.
© Bhushan Shigwan

Cheirostylis parvifolia Lindl. belongs to the family Orchidaceae of subtribe Goodyerinae and tribe Cranichideae. It shows scattered and restricted distribution in the Western Ghats and Sri Lanka (Bhattacharjee 2012, 2013). In Maharashtra, *Cheirostylis parvifolia* is restricted to the forests of the Western Ghats as it grows in the undergrowth of semi-evergreen to evergreen forest habitats. It has been reported from various locations of the Northern Western Ghats (NWG) and recently, it has been reported

from Mahendragiri, Odisha in the Eastern Ghats (Dash et al. 2015).

The authors collected the flowering plant specimens during their forest survey from Kalkai Sacred Grove of Kondedhar, Raigad District in NWG of Maharashtra. Based on the critical study of the plant, it was identified as *Cheirostylis parvifolia* Lindl. The literature survey indicated that the reported species showed the northernmost distribution in the Western Ghats of India. A short description of the species is

provided and the collected specimen has been deposited in Agharkar Herbarium (AHMA) of Agharkar Research Institute, Pune. A distribution map of *Cheirostylis parvifolia* is prepared using the locations available in the literature (Sasidharan 1997; Ganesan & Livingstone 2001; Yadav & Sardesai 2002; Jalal & Jayanthi 2018).

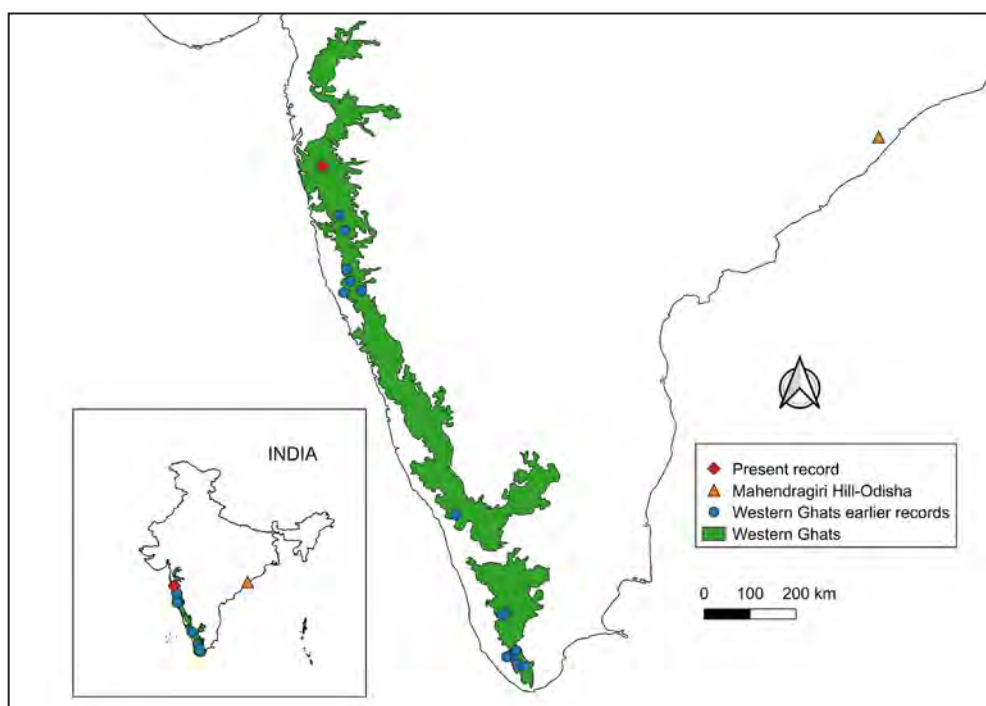
Cheirostylis parvifolia Lindl. in Edwards's Bot. Reg. 25 (Misc.): 19. 1839; Hook.f., Fl. Brit. India 6: 105. 1890; Karthik. et al., Fl. Ind. Enum. Monocot. 118. 1989; Lakshminarasimhan in Sharma et al., (eds.) Fl. Maharashtra, Monocot. 15. 1996; Yadav & Sardesai, Fl. Kolhapur District. 459. 2002; Punekar in J. Econ. Taxon. Bot. 26(1): 105. 2002; Pande et al., Wild Orch. NWG 202. 2010; A. Bhattacharjee in Candollea 67: 32. 2012; Nayar et al., Flower. Plants. Western Ghats Ind. 2: 1069. 2014; Kavade & Deokule, Fl. Chandoli National Park. 360. 2015; *Cheirostylis seidenfadeniana*

C.S.Kumar & F.N.Rasm in Nordic J. Bot. 7: 409. 1987.

Terrestrial herb, lithophytic or epiphytic; stem erect, 8–15 cm tall; rhizomes fleshy greenish-brown, creeping; leaves mostly near the base, 1–3 cm in length, ovate, acuminate and papery; flowers pinkish-white, 4–8 inscape; sepals connate; petals bi-lobed lip longer than sepal; lobes with 2–4 irregular sublobes at the apex; capsule elliptic-ovate, ribbed, and hairy.

Flowering & Fruiting: November to January.

Distribution: India (Maharashtra, Odisha, Tamil Nadu, Kerala) and Sri Lanka. Maharashtra: Kolhapur--Patgaon, Chandgad (Jalal & Jayanthi 2018), Dhajipur (Punekar 2002); Satara--Koyana (Pathare 2017), Chandoli (Kavade & Deokule 2015); Sindhudurga-Amboli (Jayaweera 1981; Almeida 1990) and Raigad-Kaikaidevi

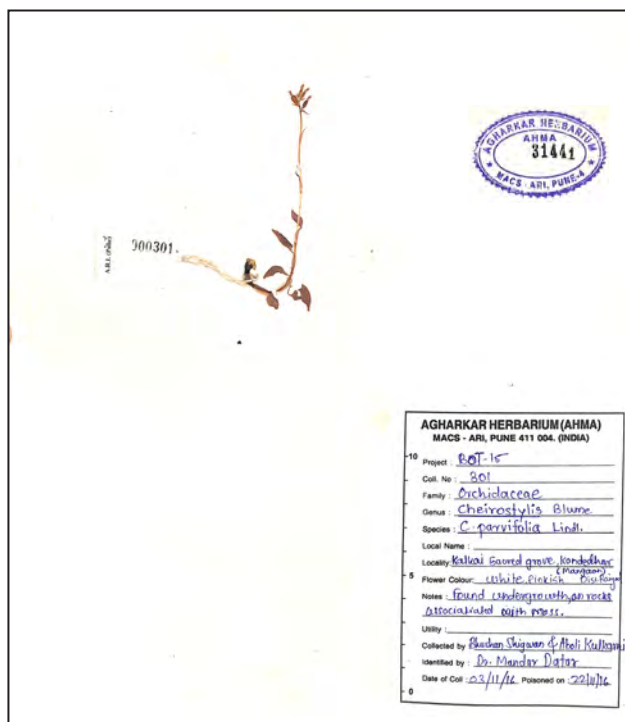


Distribution records of *Cheirostylis parvifolia* based on literature and present observation.

sacred grove of Kondedhar (present record).

Exsiccata: Kondedhar, 03.xi.2016, Shigwan & Kulkarni 000301 & 31441 (AHMA).

Ecological notes: The species was found to be growing with the help of rhizomes on boulders covered with moss. Only 10 individuals were recorded at the location. According to Bhattacharjee (2013), this species should be declared as Near Threatened (NT) following the rules of IUCN (2012). It is also prone to various disturbances in the forests due to tiny habitats. The current location of the sacred grove is close to the road and high human interference was observed which makes the species vulnerable. There is an urgent need for conservation efforts for this species distributed in the NWG.



Herbarium sheet of *Cheirostylis parvifolia* © AHMA.

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Wildlife Week Celebrations 2019 at Tata Steel Zoological Park

Tata Steel Zoological Park has been observing the Wildlife Week every year since 1994. This has been one of the longest running educational program where students from various schools in this region could participate in various competitions such as debate, quiz, essay writing, on the spot painting and fancy dress to commemorate the week. This is a reminder to our younger generation that nature is the biggest asset of human existence and we must strive to preserve its integrity. The theme for this year was – “Biodiversity and nature conservation”. The celebration commenced with huge enthusiasm from 30th September to 4th October by the participating schools.

The event started on the 30 September, 2019 with the Inter-school quiz competition held at Michael John Auditorium. More than 300 participants including audience participated. Winners of quiz competition were awarded the next day, during the formal inaugural function.

On 1 October the wildlife week celebrations was formally inaugurated at the zoo by the Chief Guest Abhishek Kumar, IFS, Divisional Forest Officer, Jamshedpur in the presence of Guest of Honour Chandramoli Prasad Sinha – Deputy Conservator of Forests, Elephant Project and Field Director. The Chief Guest, Abhishek Kumar presented the Best Eco Club Teacher Award for 2018-19 to the Winner Sangita Sarkar, Runners-up Rajalakshmi Sahu and the Special recommendation award to Sheela



Bicycle rally for saving nature.



One of the students speaking on the debate.

Sudhakaran. The winners of inter-school essay competition were also felicitated with awards and certificates. A total of 68 students from 16 schools participated in the competition.

On the third day, a bicycle rally was organized on the theme “A Rally for Nature” at 7.00 am. Dr. Hishmi Jamil Husain, Head Biodiversity, Tata Steel and Director, Tata Zoo jointly flagged off the march from zoo main gate and it concluded near Nature Education centre. In which a total of 55 cyclists participated. Thereafter, in association with Inner Wheel Club of



Winners of fancy dress parade.

Jamshedpur, ZEST, a debate competition was held on a topic “Utilization of Forest produces as livelihood is safeguard to nature conservation”. A total of 80 participants from 15 schools participated in the debate.

On the fourth day of the celebration, in association with Lions Club of Jamshedpur we organized a fancy dress parade for school children in two categories. A total of 207 participants from 27 schools participated. The respective judges of the

parade were Anup Sinha, Sumita Banerjee, Reshmi Chowdhury and Purabi Ghosh.

On the final day of the celebrations an “on the spot” painting competition was organized in association with Jamshedpur school of Art for four categories –primary, junior, middle and senior respectively. A total of 870 students from 45 schools participated and the judges for the competition were Krishna Mahato, Jaspal Singh and Lovely Jena. It was followed by the valedictory. The celebration witnessed a total number of around 1600 students across 51 institutions.

This Wildlife Week Celebrations was coordinated by Seema Rani along with her education team member Pratap Singh Gill and Zoo volunteer’s. All zoo staff and officers of the zoo provided their unconditional support to conduct the weeklong celebration very effectively.

Submitted by: Seema Rani, Biologist cum Education Officer, Tata Steel Zoological Park, Jamshedpur, Jharkhand. Email: cmarani00@rediffmail.com



On the spot painting competition in progress.



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