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AN ACCOUNT SMALL TRAVANCORE FLYING SQUIRREL, *PETINOMYS FUSCOCAPILLUS FUSCOCAPILLUS* (JERDON)

RINA CHAKRABORTY

Zoological Survey of India, 27, J. L. Nehru Road, Kolkata-700 016

e-mail : sujitrinazsi@yahoo.co.in

INTRODUCTION

The flying squirrels (Rodentia : Sciuridae : Petauristinae) are nocturnal gliding mammals, comprising of 43 species under 12 genera of which one species is found in Europe and North Asia, two in North America and all other species are confined to Asia. The species richness reaches its peak in the Southeast Asian countries (Lee and Liao 1998). Thirteen species of flying squirrel (Alfred *et al.* 2002), are so far known from India of which most of the species are concentrated in the stretches of Himalayas, and only two species are found along the Western Ghats. The Small Travancore Flying Squirrel, *Petinomys fuscocapillus fuscocapillus* (Jerdon) is one of them (Prater 1980, Ashraf *et al.* 1993).

There are two subspecies of *Petinomys fuscocapillus* of which nominate subspecies *fuscocapillus* is found in Thiruvananthapuram, Pathanamthitta and Thrissur districts of Kerala (Alfred *et al.* 2002, 2006) while the other race *layardi* is distributed in Sri Lanka (Ellerman 1961). Though 40 species of flying squirrels are distributed in the Oriental region yet there exists a significant gap of knowledge of species distribution and ecology (Lee *et al.* 1986). The Small Travancore Flying Squirrel is one of the least known species among the 13 species of flying squirrels of India and practically there is no detail account of its ecology, behaviour and taxonomy. Some stray works have been carried out by different scientists (Ashraf *et al.* 1993, Kumara and Singh 2005, Kurup 1989, Rajamani (unpublished), Xavier *et al.* 1996, 1998, Zacharias and Bhardwaj 1997). Thus, an attempt has been made here to study the status, ecology, taxonomy and behaviour of *Petinomys fuscocapillus fuscocapillus* (Jerdon).

Key Words : *Small Travancore Flying Squirrel, Kerala.*

PHYSIOGRAPHY

The State Kerala, occupies an area of 38,855 km^2 with a long 550 km coastal line along the southwestern extremity of Peninsular India. It is endowed with the best remaining rain forests in the whole of Peninsular India supporting rich and diverse fauna. Physiographically, the land is divisible into three divisions, the lowlands of coastal areas, undulating midlands of small or medium hills and the highlands occupying forested tracts of southern Western Ghats. Thick rain forests of Western Ghats are now very much destroyed and have become fragmented.

Western Ghats is a 1400 km long chain of hills that runs parallel to the west coast of Peninsular India from river Tapi in the north to Kanyakumari in the south, covering an area of 1,32,606 km^2 which is approximately 4.03% land area of India (Rodgers *et al.* 2000). The Western Ghats stretching over five states *viz.* Kerala, Tamil Nadu, Karnataka, Goa and Maharashtra lies between 8°0' to 12°30' N latitude and 75°0' to 78°30' E longitude.

The hills rise up to an average elevation of 900–1500 m, sometimes rising upto height of more than 2000 m at few places. The southern western slopes receive an average of 2000–6000 mm rainfall, and the same decreases from the north and to the east (Nair 1991).The diversity of rainfall regimes and topography have resulted in a variety of vegetation types in the Western Ghats (Champion and Seth 1968). The region possesses one of the richest biological resources forming a distinct ecological and biogeographical region of India and is considered as an extremely important life supporting system in the Peninsular India.

STUDY AREA

The Small Travancore Flying Squirrel is a denizen of rain forest (Fig. 16) and known so far from the southern most stretches of Western Ghats, so the coastal belt of Kerala was not considered during the field study. The surveys were confined in the low hill forest tracts as well as in adjacent orchards and plantations. Study was carried out in certain protected areas *viz.* Periyar Tiger Reserve, Idukki Wildlife Sanctuary, Salim Ali Bird Sanctuary, Chinnar Wildlife Sanctuary, Silent Valley National Park and Wynad Wildlife Sanctuary as well as along the forest tracts of non protected areas of Pathanamthitta, Kottayam, Idukki, Thrissur (eastern part), Palakkad or Palghat and Wynad districts and in the adjacent plantation areas (Fig. M1).

METHODOLOGY

For assessing the population and abundance of the Small Travancore Flying Squirrel, 10 to 15 plots of approximately covering 500 m^2 area were marked in each selected study area. The plots were selected inside the forest, along the peripheral region of the forest, in plantations adjacent to the forest cover and also in the plantations in the villages. The plots were hypothetically divided

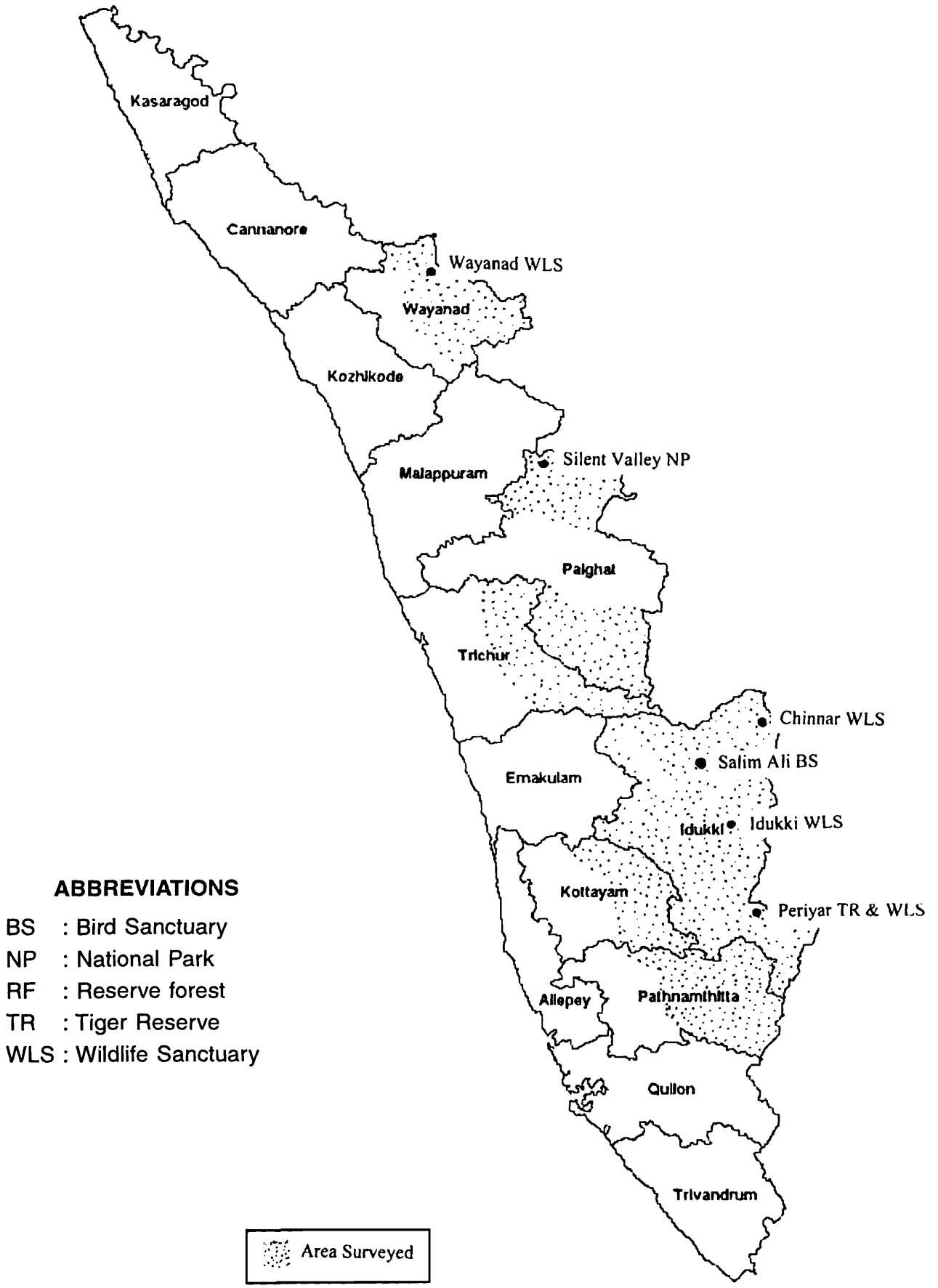

Fig. M1. : Map of Kerala.

into 25 small blocks on two or four different transects in each study area (Chakraborty and Kar 2004). The plots were set randomly according to the area surveyed. But due to certain natural obstacles, it was not possible to study each and every quadrate. In India, line transect (Burnham *et al.* 1974) and vehicle census methods are mostly adapted. But in the dense rain forest, vehicle sensus method is not possible to apply due to obvious reasons. Thus a method, walk (km)/hour was followed through the transects. Apart from the direct sighting other indirect evidences like calls, remains of non-consumed part of the food materials, people's knowledge *etc.* were also considered. As the animal is nocturnal and seldom seen, so before setting up a quadrate, opinion of the local people was also taken into consideration.

For data collection, walk through the accessible quadrates as well as trails was undertaken in every study site approximately between 18.30 to 23.30 hrs. in the evening and 4.30 to 7.30 hrs in the morning. The spotlight was used for locating the animals at night. This method is widely used in the study of other nocturnal arboreal mammals (Lee *et al.* 1993, Goldingay 1990) and has been established as effective in detecting arboreal mammals (Laurence and Laurence 1995). It is very difficult to locate or search this small sized squirrel at night within the dense high canopy forest until or unless it gives calls or glides from one canopy to other. Number of times, hours were spent under the expected roosting trees in the evening for counting the number of animals emerged from the tree holes. The Western Ghats is the home of elephants. During study the elephant corridors were avoided, as the spot lights create much disturbance to the moving heards of the elephants. Sometimes it was difficult to enter into the Protected Areas before and after the usual permissible time. In such cases much emphasis was given on the adjacent reserve forest or fringe areas.

All strata of the canopy were scanned from different angles for searching the presence of the Small Travancore Flying Squirrel. At night there were so many doubtful calls and sounds. Only after confirming the calls of the Small Travancore Flying squirrel, the animal was taken into consideration for the present analysis. For each sighting, following observations were recorded : time of sighting, approximate height at which the animal was detected, height of the tree, tree species *etc.* As the species is very rare to see, its behavioral characteristics were also recorded after confirming its presence. In forest area, number of tall trees ($\pm$20 mts) in each quadrate were counted, even where there was no encounter with the species. But in the plantation area, the trees were planted as per need and hence, counting of trees was not undertaken in such areas. The habitat comparison in between the study areas was also made, wherever it is possible. The sight areas were recorded through GPS.

The status survey was carried out during premonsoon and postmonsoon periods of 2003-2005. In addition to field survey, interactions with local people with some definite questionnaire were carried out.

OBSERVATIONS

The Small Travancore Flying Squirrel was observed only seven times during the two years surveys. It was seen four times in its feeding ground in the plantation areas. During the present survey, first sight record of this squirrel was in Salim Ali Bird Sanctuary during a walk through the trail between 18.30–19.00 hrs, on 19th December, 2003. It was observed to sit silently within the canopy approximately at a height of 15 to 20 mts. The area was within 400 m from the Range office.

On 20th December, 2003 on second occasion, it was observed in the evening at about 20.30 hrs on a very tall (approximately 20–25 m) *Hydnocarpus pentandra* tree (Local name : *marooti*) in a forest near Kotamara village, Idukki district, approximately 5 km east to Salim Ali Bird Sanctuary. It was observed that the Small Travancore Flying Squirrel, roosts in the holes of the said tree, approximately at a height of 15 mts. The fruit of the said tree is a delicacy to them and partly consumed fruit of *H. pentandra* (Figs. 17 & 18) was also found under the tree. It was also observed that, there were numbers of good, tall, old, foliaged *H. pentandra* trees in the reserve forest adjacent to the village but only a single tree was being used by a pair of the Small Travancore Flying Squirrel as their hide. The squirrels were observed to enter into the hole and coming out from the same. But unfortunately on the successive days no trace of these flying squirrels could be noticed. In third occasion the only sighting was occurred at Nemmara, Nelliyampally, Palakkad district, at about 20.15 hrs in a coco plantation on 21st December, 2003.

The fourth individual was observed on 7th May, 2005 at Njayapilly, Idukki district (10° 08' 04" N and 76° 42' 7.21" E) in a coco plantation (Fig. 12) at about 21.00 hrs. It was reported by the local people that the smaller flying squirrel lived in the nearby forest and used to come to the coco plantation when the fruits were ripe and feeds on ripen coco seeds (Figs. 13 & 14).

Fifth individual was seen at Sathrapady, Idukki district at about 21.30 hrs. on 9th May, 2005 in a coco plantation near the forest area. When the spot light was focused, it suddenly jumped from one canopy to other and ultimately was missed in a nearby forest area.

The next incidence of observation of this flying squirrel on 11th May, 2005 at Kallipara forest (10° 08' 46.1" N and 76° 43' 6.18" E), Thattekad Forest Division, Idukki district, at about 21.30 hrs when it was spotted on a *Terminalia paniculata* tree, locally called *anjili*. It was seen feeding on ripen *anjili* (Figs.19 & 20) fruits which is very much alike to small jack fruit or bread fruit. On the same night almost about a kilometer away from the earlier location, another animal was seen in coco plantation adjacent to the forest little late in the night at about 23.00 hrs. It was probably engaged in feeding on ripe coco. When the spot light was focused on it, one partly fed coco fruit was dropped down on the ground and the squirrel was seen to hide behind the canopy. In the same plantation there were nutmeg trees with ripe fruits, which were probably not relished by the squirrel as no damage fruit was observed on the tree even. From coco plantation the animal was seen to move to a nearby rubber plantation and probably very quickly moved to a nearby forest.

Last incidence occurred at Athirampally forest region of Thrissur district, while the survey party was moving through the forest road during evening time. Successive calls of squirrel were heard from the road side trees. But when the canopies searched with spot lights no animal could be identified and rather it is better to say, it hided itself either inside a tree hole or within the canopy.

The observations made by the present author or reported in past from the survey area by scientists, forest personals or local people have been tabulated in Table 1.

Table 1 : Sight record of Small Travancore Flying Squirrel, *Petinomys fuscocapillus fuscocapillus* (Jerdon).

Sl. No.	No. of sighting	Location	Time (hrs.)	Date	Place	Seen(S)/ Reported®/ Collected©
1.	One	Salim Ali Bird Sanctuary, Idukki district	18.30–19.00	19th Dec. 2003	Within canopy (not identified)	S
2.	One	Kotamara village, Idukki district	20.30	20th Dec. 2003	On *H. pentandra*	S
3.	One	Nemmara, Nelliyampally, Palakkad district	20.15	21st Dec. 2003	In coco plantation	S
4.	One	Njayapilly, Idukki district	21.00	7th May 2005	In coco plantation	S
5.	Two	Sathrapady, Idukki district	21.30	9th May 2005 and 22nd March 2005	In coco plantation	S & C
6.	Two	Kallipara forest, Idukki district	21.30 & 23.00	11th May 2005	On *T. paniculata* & coco plantation	S
7.	One	Periyar WLS, Idukki district	–	June 2004	On *H. pentandra* & *M. indica*	R
8.	One	Kokara Beat, Idukki district	–	Sept 2004	–	R
9.	One	Salim Ali Bird Sanctuary	–	–	–	R
10.	One	Ranni Forest Divn. Pathanamthitta Dist.	–	1998	–	R
11.	One	Mepaddy Range, Wynad district	–	1993	–	R

Further, the account given below is based on the observations made by other workers at different times. It was reported by Sreejish, B., a staff of Aranya Nivas of Periyar WLS (09° 34' 52" N & 77° 9' 7.03" E), Idukki district, that the squirrel was last seen in June 2004 on *H. pentandra* and *Magnifera indica* (Fig. 21) trees, when the mango fruits were ripe. It was also reported by the forest personals of Kokara Beat, Thekkady, Idukki district that the squirrel was last observed in September 2004. One specimen was accidentally found on the forest road of Salim Ali Bird Sanctuary, Thattekadu in the year 2003 and kept in a cage in the sanctuary zoo (Fig. 11). The animal was died of starvation within few days as reported by the forest personals.

So far, one specimen (Fig. 6) was collected by Dr. Kurup, ex-scientist of Zoological Survey of India from Venniculum, Pathanamthitta district on 5th May, 1987 and deposited in National Zoological collection of ZSI, Kozhikode, Kerala. It was collected from the crown of a coconut tree while it was roosting within the foliage at about 8.30 am. It was probably an accidental catch. The actual location is approximately 7 km from Sabrimala temple and 24 km away from Ranni forest Division. In the Ranni Forest Division of Pathanamthitta district, it was last seen in 1998 as stated by the forest personals.

The species was also reported from the Munnar-Kuttampuzha of Idukki district (Johnsingh 2001), Munnar, Knacherry Forest, Neriyamangalam Range (10° 07' N & 76° 46' E), Idukki district and Kuttampuzha, Pooyankutty (10° 07" N & 76° 50' E) (Rajamani, unpublished). This squirrel was not observed in Marayoor or Chinnar WLS of the same district during the present survey and there was no previous record also from this region.

Though it was reported from Nemmara, Nelliyampathy of Palakkad district but the species was not found in the Protected Areas surveyed or in Silent Valley National Park and its adjacent areas. It was last reported from Meppady Range, Wynad Forest Division of Wynad district in 1993 by Sri N.K. Sashidharan, the then DFO and another incidence was in 1989, which was reported as subjudice by the forest department. No smaller flying squirrel was observed or reported from the Wynad Wildlife Sanctuary during the current survey of that region.

One specimen was shot and collected by local police in Chalakudy Forest Division and thought it was a strange animal and ultimately handed over to the College of Veterinary and Animal Sciences, Thrissur district for further forensic study (Xavier *et al.* 1998) but the skin was not preserved. Zacharias and Bhardwaj (1997) reported the species from Periyar Tiger Reserve.

It was also reported from the Shendurney WLS, Pepara WLS and Achankovil Reserve Forest (Rajamani, unpublished) but the areas were not surveyed by the present survey party.

BEHAVIOUR

Only once, it was observed that the squirrels came out from their hide late in the evening very silently, moved towards the high canopy and glided to the feeding ground. The animal is very shy

and if not provoked, it is not heard to make any sound. The sound was heard only once from the roosting place in *H. pentandra* tree which was disturbed for observing the squirrel near Kotamara village. It is not sure the call heard at Athirampally was of Small Travancore Flying Squirrel. The call heard at Kotamara was chik-k, chik-k which ended with a grawl. In all the five instances it was noticed that the animal prefers to live in the forests with a good number of old *H. pentandra* trees. It was only seen to come out from the hide for feeding in the nearby plantation or inside the forest. In the dark night it is really difficult to locate and identify the squirrel in the thick canopy of Rain Forest even after searching with the help of a good search light. Except once, during the walk through the forest tracks either at dawn or dusk no sign of the smaller flying squirrel was observed. It is comparatively easy to locate in the moonlit night when it glides from one canopy to other. While gliding, it's size is little bigger than a full plate which tapers towards posterior end with rather flat tail may be the only identifying character in the field. It can float in the air for more distance, than that of a larger flying squirrel of the same region. When observed within the canopy, it's round, dark, bright eyes and chestnut tinge of fur may be the only sign of its presence.

It was observed that during feeding it holds the fruit with the forehands and make hole in the middle of the fruit (Figs.14 & 15) and take out the seeds. It is capable of taking seed without detaching (Fig. 15) the fruit from the stalk. As per present observation, the most preferred food of this squirrel is fruit of *H. pentandra* (Fig. 17) in wild and coco and mango in plantation (Figs. 13, 15, 21). Other than these, it takes fruits of *Artocarpus hirsutus, Syzygium cumini, Grewia tillifolia, Ziziphus rugosa, Pisidium guajava, Lantana camara, Caryca arborea and Olea dioiea* (Xavier *et al.* 1996) and also flowers and barks of certain other plants. It also takes fruits of *Anjili* (Figs. 19 & 20). It is also reported by the local people that it also consumes fruits of Mangostin and Rumbestem. Nothing is known about its reproductive biology except a report that female gives birth to two youngs (Alfred *et al.* 2006).

TAXONOMY

Genus ***Petinomys*** Thomas

1908. *Petinomys* Thomas, *Ann. Mag. Nat. Hist.*, **1** : 6.

1847. *Sciuropterus fuscocapillus* Jerdon in Blyth, *J. Asiat. Soc. Beng.*, **16** : 867.

1850. *Sciuropterus layardi* Kelaart, *J. Ceylon Br. Asiat. Soc.*, **2** : 215 (328 of 1887 reprint)–Ceylon Race.

Key to the races of *Petinomys fuscocapillus*

1(2). Cheeks and sides of belly white ..... *P. f. fuscocapillus*

2(1). Cheeks and belly gray ..... *P. f. layardi*

N. B. : Wroughton (1915) stated 'The type of *layardi* Kelaart is in the National collection-the type of *fuscocapillus* is apparently lost, and the only thing I have to represent is a mutilated flat skin collected by Mr. Bourdillon in Travancore. Kelaart in his description of *layardi* says "beneath gray" while Blyth writes of *fuscocapillus* "underparts rufous white extending to the cheeks and under-lip, the lateral fur margining the membrane rufofulvous" (Ellerman 1961).

Only three damaged skins of *P. f. fuscocapillus* are present in different museums of the world. The specimen present in the Natural History Museum, London, U.K. is presumably, the one collected by Bourdillon from Travancore (Wroughton 1915). Hutton (1949) included the subspecies in his account of the mammals of high wavy mountains in Madurai district, Tamil Nadu. It is now understood, the Bombay Natural History Society has one specimen collected by him, whose locality labeled merely as Travancore (Kurup 1989). The third specimen was collected by Kurup in 1987 from Vennikulum (76° 37' E and 9° 23' N), Pathanamthitta district, Kerala.

Other than the above mentioned three specimens (flat skin) one stuffed specimen is present in Thekkady Nature Education and Interpretation Centre, Periyar WLS and another in Zoological Survey of India, Kolkata.

Description of the Holotype (after Jerdon 1847)

Petinomys fuscocapillus (Jerdon, 1847)

1847. *Sciuropterus fuscocapillus* Jerdon in Blyth, *J. Asiat. Soc. Beng.*, **16** : 867.

"This is an undescribed species, from S. India, a notice of which may be introduced here : Length 7½" (190.5 mm), of tail (vertebrae) 6" (152 mm), the hair reaching 3/4" (19 mm) further; fore-foot proportionally large, measuring with claws $1\frac{1}{8}$" (28.5 mm); hind feet wanting in the only specimen examined. Ears small, and almost wholly naked, of an ovate form, and measuring ½" (13 mm) long posteriorly. Tail very bushy, and but indistinctly distichous. Moustaches long and black. Fur rather long (the hairs measuring fully 3/4" on the back), porrect, of extremely fine texture, the individual piles sinuous, and those of the upper parts fuscous to near the tips, which are of a rufescent-fulvous hue, or dark brownish-isabelline, forming the surface colour; on the croup the fur is shorter and more dense; and upon the head it is much shorter, and the basal dusky hue predominates over the grayish brown tips; above the volar membrane also the blackish hue is chiefly apparent. Under-parts rufous-white, extending to the cheeks and under-lip; the lateral fur margining the membrane rufo-fulvous. The hairs of the tail measure 1" (25.4 mm) and upwards, for its basal half or more, becoming gradually rather shorter towards the tip; their colour pale at base, then darker, producing an *ensemble* nearly of the colour of the back; but underneath, the tail is fuscous or blackish-brown, and the extreme tip is whitish."

Description of the specimen present in
Thekkady Nature Education and Interpretation Centre
(Figs. 1 & 2)

Specimen : Stuffed (Damaged).

Locality : Periyar Wildlife Sanctuary.

Colour : Head cinnamon-brown, hairs speckled with white at tip; ears small, roundish; whiskers black; neck same as head but little darker; back cinnamon-brown speckled with black; a dark ashy-grey patch on rump; sides of the patagium blackish-brown or dark, the inner side (attached with body) of the patagium cinnamon-brown speckled with black hair tip; the colour of the lower legs nearer to rump area is little darker than rump; proximal $\frac{1}{3}$ of tail is creamy buff (may be due to shading of top hairs) and the rest is light cinnamon-brown; a central black line under the tail; underparts yellowish white or creamy buff; underparts of patagium light cinnamon; patagium not extended beyond hind leg.

Measurements : (Taken from dry stuffed specimen) HB : ±323 mm; TL : ±270 mm; HF : ±40 mm; E : ±15 mm. Maximum length of whiskers 52 mm; free tip of tail 17 mm.

Details of the specimens present in the Zoological Survey of India, Kozhikode, Kerala
(Figs. 6, 7 & 8)

Specimen : Skin (Damaged), skull attached with the skin.

Locality : Venniculum, Pathanamthitta district, Kerala (9°23' N and 76°37' E).

Date of collection : 05.05.1987.

Sex : Female.

Colour : Reddish brown; tail, little lighter than body.

Measurements : HB 280 mm; TL 240 mm; Skull 50.1 mm; Diastema 9 mm; Length of tooth row 8 mm; Bullae 8 mm (Not much flattened).

Description of a specimen after Xavier *et al.* (1996)

Colour : Dorsum dark brown, tail long and bushy, lighter in shade; eyes large and round; whiskers dark in colour; parachute translucent having a brown hair cover.

Sex : Female.

Measurements : Total length 530 mm (from head to tail tip); TL : 270 mm; tip of nostril to base of ear 40 mm; width of forehead 40 mm; length of parachute 300 mm; width of parachute near forelimb 125 m and near hindlimb 100 mm.

Remark : Skin not preserved.

Description of a specimen present in the Bombay Natural History Society

(Figs. 4 & 5)

Specimen : Skin (Damaged) : Reg. No. 7106; Collector : A.F. Hutton.

Locality : Travancore.

Colour : Dorsal rufous brown; head and sides of body rather dark; tail lighter; cheek and throat light yellow or whitish yellow; hind foot damaged.

Remark : Kurup (1989) stated that the specimen was from high wavy mountains of Madurai district, Tamil Nadu.

N.B. : Description based on a photograph received from BNHS by courtesy.

Description of a specimen present in the Natural History Museum, London, U.K.

(Fig. 3)

BM(NH) 1880.8.23. 1 skin, Travancore, Collector-F.W. Bourdillon.

Colour : Dorsal rufous brown; sides of the body dark; right hindfoot wanting; tail damaged, except a little proximal part distal part wanting.

N.B. : Based on a photograph received from BM(NH) by courtesy.

Description of a specimen present in Zoological Survey of India, Kolkata

(Figs. 9 & 10)

The specimen was received from Dr. R. Sugathan for depositing in the National zoological collection of ZSI, Kolkata. As the report received, the specimen was collected dead and damaged during forest fire from Sathrapady on 22.03.2005.

Measurements : Measurements were taken from a dry, stuffed specimen. HB : ± 185 mm; Tail, wanting; HF : ±35 mm; E : ± 12 mm, roundish and naked.

Colour : Almost same as the specimen present in the Nature Education and Interpretation Centre of Thekkady. Upperparts more grayish with rufous wash; a dark ashy grey patch is present on the back just above the tail; underparts whitish extending up to cheeks; sides of the patagium dark.

Remark : Likely to be sub-adult.

ABBREVIATIONS : HB. Head and body length; TL. Tail length; E. Ear length; HF. Hind foot length.

RESULT AND DISCUSSION

There are eight species of the genus *Petinomys* (Walker *et al.*1983) distributed throughout the southeastern Asia of which only *P. fuscocapillus* is distributed in Sri Lanka and southern part of

Western Ghats. Among the two subspecies only the nominate subspecies *fuscocapillus* is distributed in certain pockets like Anamalais, Chalakudy Forest Division, Periyar Tiger Reserve (Zacharias and Bhardwaj 1997), Pathanamthitta district (Kurup 1989), Shendurney WLS and Achankovil RF (Rajamani, unpublished), Peppara WLS, Srivilliputhur, Kodayar, Peechi (Molur and Walker 1998) of southern Western Ghats of India. Other than these the species is reported from certain parts of Idukki, Palakkad, Wynad, Thrissur and Kollam districts also. Kumara and Singh (2005) reported the species from Karnataka. Menon (2003) mentioned that the species is found along the Western Ghats of Tamil Nadu, Kerala, Karnataka and possibly Goa but so far no such authentic record is available from Goa. As per direct and indirect evidence this smaller flying squirrel is distributed only in certain pockets and the population is so thin and fragmented, that the animal is seldom seen.

The species is an inhabitant of moist-deciduous, semi-evergreen and evergreen forests (Molur and Walker 1998). However, present study reveals that it prefers to live in the peripheral region of the forest from where it usually comes out at night to the neighbouring orchards or plantation for feeding. In fact, it was never met in the dense forest during the study period, though in the Indira Gandhi National Park of Tamil Nadu and Periyar Tiger Reserve, it is reported to live in the dense forest area (Kumar *et al.* 2002; Zacharias and Bhardwaj 1997). Xavier *et al.* (1996) also reported the species from a village adjacent to Vazhachal Forest Division of Thrissur district, Kerala. Probably that was the first record of this species from central Kerala between 70° 10' and 76° 40' E and 10° 15' and 10° 30' N. Kurup (1989) also collected one specimen (Fig. 6) far from the Ranni Forest Division from a coconut plantation. One specimen (Fig. 11) was accidentally collected from the forest road of Salim Ali Bird Sanctuary of Thattekad by the forest staff and kept in the zoo of the same sanctuary. It was reported that, the specimen died due to starvation and shock. The skin and skull of the specimen was not preserved. The specimen collected from Sathrapady was also from a rubber plantation. From the history of the collection of this smaller Flying Squirrel, it is clear that the catches reported so far are accidental.

It was noticed that the dorsal colouration of the preserved specimens present in BNHS, BM(NH) and ZSI, Kozhikode are more rufous than the specimens of the Thekkady, Thattekad and ZSI, Kolkata. It may be due to seasonal and/or age variation. At the same time ashy rump patch is not clear in three individuals (Figs. 3, 4, 6) but whitish venter and cheeks are predominant in all the specimens.

On every night a walk of approximately 2-4 km was undertaken at the rate of 0.5-1.2 km/hour both through the quadrates in forest and plantation as well as through the forest trails. Though quadrate was tried for population study yet in practice this method was not found to be useful. From the study, it reveals that, distribution of the species even in a selected forest area is more patchy than other arboreal rodents and, thus at the time of population estimation most of the quadrates were found to be without any individual and resulted nil. Moreover, the animal was never seen twice in the same site.

Call of the squirrel is not uncommon in the forests of Western Ghats but call of the Small Travancore Flying Squirrel was heard and identified only once in Kotamara village. However, successive attempts to record or confirm the calls failed. It is obvious that it sounds very rarely and at the same time the population is also very thin which ultimately prevented for catching the call of the animal to be identified independently.

It was also attempted to collect and identify the non-consumed food parts of the smaller flying squirrel during day time. As the food items may be shared by other squirrels like *Petaurista, Ratufa etc.*, the same could not be detected for this species. Only some damaged fruits was under the roosting or feeding trees were collected (Figs. 13-15, 17-21), during its feeding time at night and identified.

Except one *H. pentandra* tree in Kotamara village, no other tree was identified as its roosting tree and at the same time sighting of emergence of two individuals was experienced only once. Time of sighting was usually in between 20.00 to 23.00 hrs. except once in Salim Ali Bird Sanctuary, where it commenced at dusk. It was never mate with during dawn. In wild, preference for the tree species of this flying squirrel was mostly identified as *H. pentandra* and the animal was observed mostly in plantation of coco. Hence, preference towards other wild plants was not studied. In the typical forest, there were at least 10-15 large trees in each smaller quadrate of which any one might be the roosting tree for that squirrel. As the squirrel was seen only once in a tree hole of *H. pentandra* tree, thus, it is not wise to conclude anything about its roosting preference.

The presence of the species was confirmed both by direct sighting and indirect evidence. Practically, information received from the local people was more fruitful than any other indirect evidence. Except one from Palakkad, in the present study all the sighting records were from Idukki district only (Table 1). There was no sighting record from the other districts except a very recent record by Rajamani (unpublished). Moreover, there was no report of regular sighting of this species from any area.

The main threat of survival of this species is habitat loss and fragmented distribution. Probably the pressure of persecution by local people is minimum and at the same time less important in trade due to its smaller size, very soft skin and rarity.

The status of *Petinomys fuscocapillus* as per IUCN (2006) is LR/lc. However, after the present study of *P. fuscocapillus fuscocapillus*, it is hereby suggested to include the Indian sub-species in 'Vulnerable' category as it was proposed earlier in 1998 and 2000 based on the IUCN version 2.3 (1994). This species is already protected under Indian Wildlife (Protection) Act. 1972 (as ammended upto 2004) in Schedule I, Part I. Moreover, according to Red Data Book (1994) the status of the Indian race has been declared as 'Endangered'

SUMMARY

The Small Travancore Flying Squirrel, *Petinomys fuscocapillus fuscocapillus* (Jerdon) is distributed only in the southern region of Western Ghats. The study reveals that, the population of this smaller flying squirrel is very thin. As per sight record, the population density of the species is rather better in Idukki district than other districts of Kerala. It is fond of fruits of *Hydnocarpus pentandra*, (local name *: marooti*), *Terminalia paniculata* (local name : *anjili*), coco, mango *etc.* The status of the Indian sub-species may be recommended here as 'Vulnerable'

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