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Observation on the Raising Newborn Litters by the Indian Northern Palm Squirrel (*Funambulus pennantii*)

Newton Paul

Department of Zoology, Isabella Thoburn College, Lucknow, Uttar Predesh, INDIA

Corresponding author: N Paul; E-mail: newton.mymail@gmail.com

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ABSTRACT

Parent care in Indian palm squirrels is a natural behaviour. Palm squirrels (*Funambulus pennantii*) especially females (also helped by male but not always) take care of their young ones until they are capable to feed by themselves. They have given birth to one to three young ones at a time, but survival depends upon the mother feed and environmental conditions. The feeding habit of squirrels and seasons influence the nutritional properties of milk for the nourishment of young ones. During the breeding season, study finds that squirrel prefers to give birth in the old nest if available or not destroyed otherwise squirrel have made a new nest from cotton cloth, jute rope (always preferred) and mattress (coconut fibers). Development of young ones depends on the nutrition of mother milk and number of young ones. Male squirrel give protection to young once from predator like kites and hawks by making sharp, high-pitched alarm calls at the time of danger.

HIGHLIGHTS

- Litters has learned all required communication skills from mother at early stages of development.
- Number of litter birth has significant role in development.

Keywords: Parent care, behaviour, nest, milk nourishment

Parental care is a natural behaviour among the parents especially in the female than males, which behaviour involves females taking care of young ones for some time for the survival of their races. Adaptation for survival in nature is a natural phenomenon, through which animals live in different drastic environmental conditions and successfully survive.

The Indian squirrel comes under class Mammalia, order Rodentia due to the presence of a single pair of regularly growing incisors in each jaw used for gnawing and belongs to the genus Funambulus of the family Sciuridae. There are six species of Funambulus genera that spread in Asia viz. *Funambulus layardi* (Layard's palm squirrel), *Funambulus palmarum* (Indian palm squirrel), *Funambulus tristriatus* (Jungle palm squirrel), *Funambulus pennantii* (Northern palm squirrel), *Funambulus obscurus* (Dusky palm squirrel), and *Funambulus sublineatus* (Nilgiri striped squirrel) (Srinivasulu *et al.,* 2003; Dissanayake, 2012; Ramesh *et al*., 2019).

Northern palm squirrel (*Funambulus pennantii*, Wroughton, 1905) is distributed in several states throughout India like Uttar Pradesh, Uttarakhand, Delhi, Haryana, Punjab, Rajasthan, Madhya Pradesh, Bihar, Chhattisgarh, Jharkhand, Orissa, Assam, Sikkim, West Bengal, Maharashtra Gujarat, Karnataka, Andhra Pradesh, as well as *Andaman and Nicobar Islands*. Squirrel is also found in Nepal, Pakistan, Bangladesh, and Sri Lanka (Srinivasulu *et al.*, 2003). They preferably choose to thrives well in urban areas, gardens, forests, and plantations.

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Northern palm squirrel is a five-striped small animal with having a slender body with a long fluffy tail which is used as an umbrella during summer, act as a sensory organ at the time of danger and also used a balance. The body colour is greying brown to olive-brown with body weight is about 147 grams and length range from 13-15 cm (Sayyed and Mahabal, 2016). It is active in day time and hide at night.

Northern palm squirrels come under the category of herbivores and omnivores depending upon the food availably. They mainly prefer to eat a variety of different parts green plants and their fruits, nuts, seeds viz. newly develop fresh leaves, flowers, buds, barks and sometimes feed on insects and their larvae. They have also been reported feeding hatched young ones of birds (Nowak, 1999).

Northern palm squirrels are gregarious animals, always live in colony or group and make nest in and around their other family member's nest. The most suitable breeding period are March to April and July to September as the food availability is more (Sharma, 2016). During breeding season, female and male attract to ether due to hormonal influence, after copulation gestation period begins after that females give birth to one to three litter in a nest.

MATERIALS AND METHODS

The study site was a residential area and has dense greenery with trees and bushes along with climber plants (like grape). The observation was noticed and recorded without disturbing the female squirrel and their new born litters. The squirrel is preferred to live near the human population for easy availability of food. The study of parent behaviour on squirrels was conducted in Mahanagar located in Lucknow, Uttar Pradesh (Latitude: 26.874920 and Longitude: 80.955292 and GPS coordinates is 26° 52' 29.712'' N 80° 57' 19.0512'' E). The observations were made in the months of March to May 2024 during the spring and autumn seasons.

RESULTS AND DISCUSSION

Generally, squirrels are living in small groups on a tree or any man-made safe place. Females are more in the groups than males so there is fighting behaviour for territories and only dominant squirrels can mate with females. During breeding seasons especially March to May, the male who win fight mates with females and then leave her. One male in his territories has more than three females as per observation in study area. The suitable and favourable breeding season is autumn which is very good for mothers to get nutritious food for the nourishment of young ones as most of plants are growing with new leaves that feed by squirrel.

Northern palm squirrels are very active in daylight for breeding, playing, and foraging for food but are rarely seen at nighttimes (Nowak, 1999). The squirrels are yell and chatter continuously to protect their territories from other squirrels, alert their neighbouring from predators like hawks and attract another squirrel for mating during the breeding season (Mitchell, 1979).

Females have 1 to 3 litters at a time in a year depending upon the mating periods. The gestation period of the squirrel was 37 to 42 days. The weight of a litters was 6-8 grams depends on the birth number. The milk feeding period of the litters was 2 months. Both males and females attain maturity in 6 to 11 months but females (8 months) mature early than males (10 months) (Nowak, 1999). Mainly male and female mating occurs in the months of March to April and July to September. Male is selfish and leaves female after mating; the only mother alone raises the litters by protection and nutritive feed. Before the birth of a young one (litters) mother has wisely chosen a suitable and safe place, mostly prefer an old nest if available not occupied by another squirrel. Otherwise, female squirrels have to make a new nest from a variety of materials like cotton cloth, jute rope (always preferred) and mattress (coconut fibers), etc. Female shows very attentive and protective behaviour as a parent for two months till the young ones are self-dependent and after that teach them how to get food or which food is nutritious and how to protect themselves or their other members of the colony by a vocal alarm sound.

Raising new born litters are very difficult task by female squirrel, during nurturing female squirrel gave full attention to their new born litters without feeding for a long time (Around 24-48 Hours Depends upon the habitat). Nutritional intake of litter from mother squirrel determines their maturity on time. Single litter has no other competitor to share their mother squirrel nutritional milk and food whereas on the other hand more than three litters have to share their mother milk and food, this sharing may

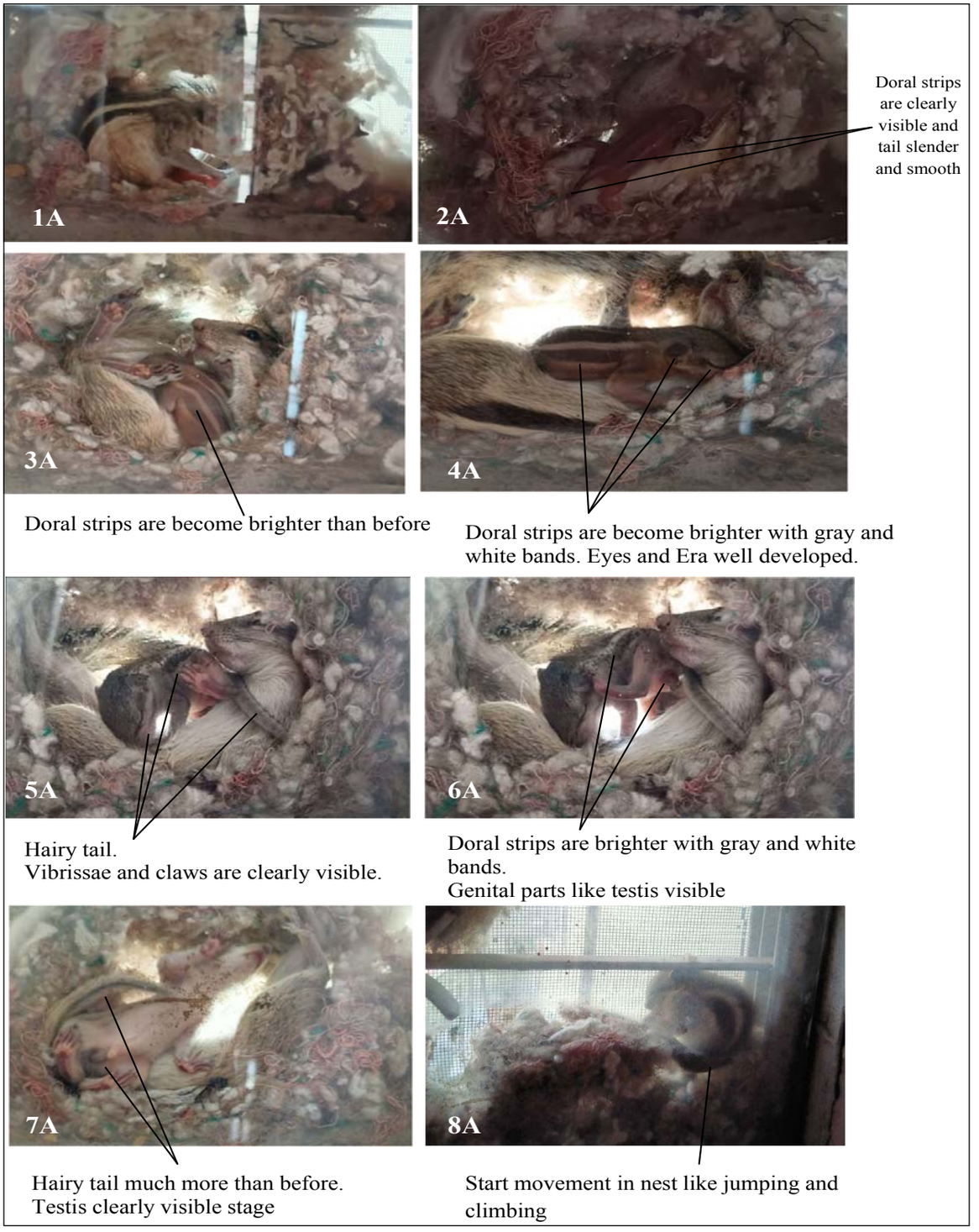

Fig. 1A-8A: Showing development of squirrel litters (NPS-1)

Fig. 1B-8B: Showing development of squirrel litters (NPS-2)

delay their growth and maturity (Reina Hashimoto *et. al*., 2025).

Two different female Northern palm squirrels had given birth in the same nest in different months. NPS 1 (Northern palm squirrel-1) had given birth to one male litter in the months of February 2024 (Fig. 1A). After birth litter eyes was close and crawl over ventral side of mother for feeding of milk (Fig. 2A). Litter was feeding three to five-time at regular intervals by taking short naps till 15 days after that frequency of milk feeding was reduced. On 8th day Doral strips were become brighter than before (Fig. 3A). After 12 days litter Doral strips were become brighter with gray and white bands. Era well developed, tail hairy than earlier stage (Fig.4A). Doral strips were brighter

with gray and white bands and tail becomes hairy. Genital parts like testis along with Vibrissae and claws are clearly visible after 17 days (Fig. 5A; 6A and 7A). After 17 days mother feed the young ones two to three times a day and sometimes it was observed that the mother refused to feed them. Within one-month (29 days) litter was capable to start a movement in the nest (Fig. 8A). Mother takes him for foraging of food near the nest not far from the nest. It was observed that mothers make a new nest for their young ones within 100 feet of their nest and place their young ones in the newly made nests. It was also observed that when mothers search for food always takes their litters to teach basic survival trick to survive in nature. The teaching and learning practices include how to make alarm call to alert their neighbour from any predators, communication skills with another member of the colony, and how to make and protect the territory from any other squirrels.

Second NPS-2 (Northern palm squirrel-2) had given birth to three litters in which one male and two female in the months of April 2024. It was the second squirrel to choose the old nest for raising their babies. The parent care and nurturing behaviour of NPS-2 was the same as observed in NPS-1 only the difference was in the birth number of litters. Three litters (one male and two female) were born on 10 April, 2024, with close eyes and crawl over ventral side of mother for feeding of milk (Fig.1B). Doral strips were formed and clearly visible and tail slender and smooth (Fig. 2B) after 3 days. On 5th day era clearly visible with dorsal strips and close eyes (Fig. 3B). After 9 days, size of litters increases and dorsal strips brighter than before (Fig. 4B). Eyes open with well-developed ear and tail. Dorsal strips become now clearly visible with grey and white bands (Fig. 5B) on 14 days. After 35 days litter start movement in nest like jumping and climbing and learning process from mother started (Fig. 6B). After 43 days litters start feeding fruit of Anjeer (*Ficus*) and outside the nest and begin foraging behaviour for food (Fig. 7B). Litters of NPS-2 take more time to develop than NPS-1 babies. The reason might be the feeding a diet of the litters. NPS-1 had one baby whereas NPS-2 had three babies so the nutritive milk was shared by three litters and sometimes one of them was feed less milk than the other. But it was observed that all litters develop at the same rate (Fig. 6B). After 43 days litters of NPS-2 have started a movement and foraging for the food along with mother (Fig. 8B).

CONCLUSION

Northern palm squirrel is an intelligent and attentive female that nurtures properly their young ones till litters were independent. During observation, it was noticed that mother squirrels teach them litters that is required for the survival in the nature like alarm calls or communication with other squirrels for that mother start call note at every day in the morning for around 15 to 30 minutes. Mother regularly clean their litters by licking them and also guard all the time till 10-15 days for that mother does not go far from the nest for food just search food near the nest. It was also noticed that mothers themselves make a new nest for their young ones near or within 100 feet of their nest for observation and protection. When a young one attains or looks like a mature and starts foraging of food by itself then mother leaves them in the new nest. Sometimes it was observed that young ones come back to the old nest and live with their mother but it was not for a long time. In the study, it was observed that single litter grow up early then three litters, as single litter get more nourishment then three litter. Single litter was taken about 30 days to self-feeding stage where as three litter were foraging for food after 43 days.

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REFERENCES

Dissanayake, R. 2012. The Nilgiri striped squirrel *Funambulus sublineatus* and the dusky striped squirrel *Funambulus obscures*, two endemic fauna of India and Sri Lanka. *Small Mammal Mail*, **3**(2): 6-7.

Mitchell, R. 1979. The sciurid rodents (Rodentia: Sciuridae) of Nepal. *J. Asian Ecology*, **1**: 21-28.

Nowak, R. 1999. Walker's Mammals of the World. Baltimore: *Johns Hopkins University Press*.

Reina Hashimoto, Yuka Takeichi, Asuka Hayashi, Takumi Akasaka, Tatsuo Oshida. 2025. Seasonal variation in litter size of Siberian flying squirrels (*Pteromys volans*). *J. Mammal.,* https://doi.org/10.1093/jmammal/gyaf024

Sayyed, A. and Mahabal, 2016. A First record of leucism in five striped palm squirrels *Funambulus pennantii* (Rodentia: Sciuridae) from India. *Small Mammal Mail,* **8**(1): 8.

Sharma, R. 2016. Reproductive Behaviour of *Funambulus pennantii* A Case Study of Ajmer Rajasthan. *IOSR J. Pharm. Biol. Sci*., **11**(4): 51-53.

Srinivasulu, C., Chakraborty, S. and Pradhan M.S. 2003. Checklist of Sciurids (Mammalia: Rodentia Sciuridae) of south Asia. *Zoos Print J.*, **19**(2): 1351-1360.

Yadav, R.S., Painkra, G.P., Kerketta, D. and Kumar, D. 2019. First Record of Leucism in Five Striped Palm Squirrel, *Funambulus pennantii* (Rodentia: Sciuridae) from North India. *Int. J. Curr. Microbiol. App. Sci.,* **8**(10): 1956-1961.