



RESEARCH ARTICLE.....

Diurnal reproductive behaviour of Indian flying fox, *Pteropus giganteus*

RAM KUMAR, DEEP NARAYAN PRASAD AND VADAMALAI ELANGO VAN

ABSTRACT..... The reproductive behaviour of Indian flying fox, *Pteropus giganteus* was observed at a maternity colony situated in Ambedkar Nagar district of Uttar Pradesh, India. The behavioural activities of *P. giganteus* at pre- and post-copulation period was observed. The bats were actively involved in copulation from July to November, however the frequency of copulation was higher during September. Although, bats were engaged on reproductive activities over the day but intensive copulation was observed during the forenoon than afternoon hours. The bats chosen the peripheral and open canopies for copulation than leafy and dense area. The male individuals consistently courted the females by stretching their wings, licking vulva and producing vocal sounds. The observation on vulva licking showed a significant relationship with duration and frequency of copulation. Hence, the finding of this study may use substantially in further studies with reference to reproductive aspects of bats biology.

Author for Corresponding -

VADAMALAI ELANGO VAN
Department of Applied Animal
Sciences, Babasaheb Bhimrao
Ambedkar University, LUCKNOW
(U.P.) INDIA
Email : elango70@yahoo.com

See end of the article for
Copied authors'

KEY WORDS..... Copulatory behaviour, *Pteropus giganteus*, Reproductive season, Roost site selection

HOW TO CITE THIS ARTICLE - Kumar, Ram, Prasad, Deep Narayan and Elangovan, Vadamalai (2017). Diurnal reproductive behaviour of Indian flying fox, *Pteropus giganteus*. *Asian J. Animal Sci.*, 12(2): 134-137. DOI : 10.15740/HAS/TAJAS/12.2/134-137.

ARTICLE CHRONICLE - Received : 20.10.2017; Revised : 09.11.2017; Accepted : 22.11.2017

INTRODUCTION.....

The order chiroptera present an amazing biodiversity of about 1300 species identified from various geographical regions (Shi and Rabosky, 2015). The inaccessible roost height makes them a typical taxa and hence, very fewer studies have been carried out on various aspects of bats (Maruthupandian and Marimuthu, 2013). During reproductive seasons, flying foxes are actively involved in various reproductive activities (Tan *et al.*, 2009; Maruthupandian and Marimuthu, 2013 and Sugita, 2016). Therefore, this study was aimed to observe

and quantify their reproductive behaviour of Indian flying fox, *Pteropus giganteus* in Uttar Pradesh.

RESEARCH METHODS.....

An extensive field observation was carried out between 2013 and 2016 during the reproductive seasons of *Pteropus giganteus* in a colony located at Nassulapur, Ambedkar Nagar district, Uttar Pradesh, India (26°32'40.81"N; 82°33'40.59"E). The individuals of *P. giganteus* were roosting on *Ficus benghalensis* (n = 1), *Azadirachta indica* (n = 1), *Mangifera indica* (n =

13) and *Ficus religiosa* (n = 1). The reproductive behaviour of *P. giganteus* was observed from a vantage point. In addition, the frequency, time and duration of copulations were observed. Further, the frequency of wing stretching, vulva licking, and grooming was observed through binocular and precisely recorded through stopwatch. The Pearson correlation (r) was applied to study the relationship between the duration of vulva licking and copulation.

RESEARCH FINDINGS AND ANALYSIS.....

After the home flight, the individuals of *P. giganteus* were actively engaged in roost alteration which facilitated them finding suitable mates. The male bats made many circling flights around the roost and exhibited quadrupedal movement until finding a suitable mating partner. The bats have selected a few tree species such as *Ficus benghalensis* (n = 1), *Azadirachta indica* (n = 1), *Mangifera indica* (n = 13) and *Ficus religiosa* (n = 1). The roosting pattern of *P. giganteus* varied over reproductive season, a few individuals of *P. giganteus* were roosting at the base branches of the roost tree while reproductively active individuals observed at peripheral canopies. Hence, the reproductively active bats were observed from peripheral canopies rather than dense and leafy area. The reproductive behaviour of *P. giganteus* was varied over the reproductive season from July to November. The higher number of copulation was recorded during September (6.3 ± 5.7 SD) followed by October (3.3 ± 3.0 SD) while very few copulations were observed during July (1.2 ± 0.4 SD) and November (1.0 ± 0.5 SD, Fig. 1a).

The bats made loud screams during copulation and they were more active during cloudy hours than sunny period. The male bats were very active and involved in courting of females mainly during forenoon (cloudy hours) than afternoon (sunny hours, Fig. 1b). As pre-copulation activity, the male bat approached a female and courted by stretching its wings. The male exhibited an average 16.2 ± 4.5 SD wing stretching and 65.5 ± 26.8 SD vocalization prior to copulation. The courting behaviour is associated with sexual potentiality of male and determine mate choice in *P. giganteus*. Once a male courted a female, the male engaged in vulva licking (36.32 ± 6.48 sec, n = 84, Fig. 2a) before copulation. During the copulation, the male gripped the female through claws and mouth and sometimes wraps by patagium.

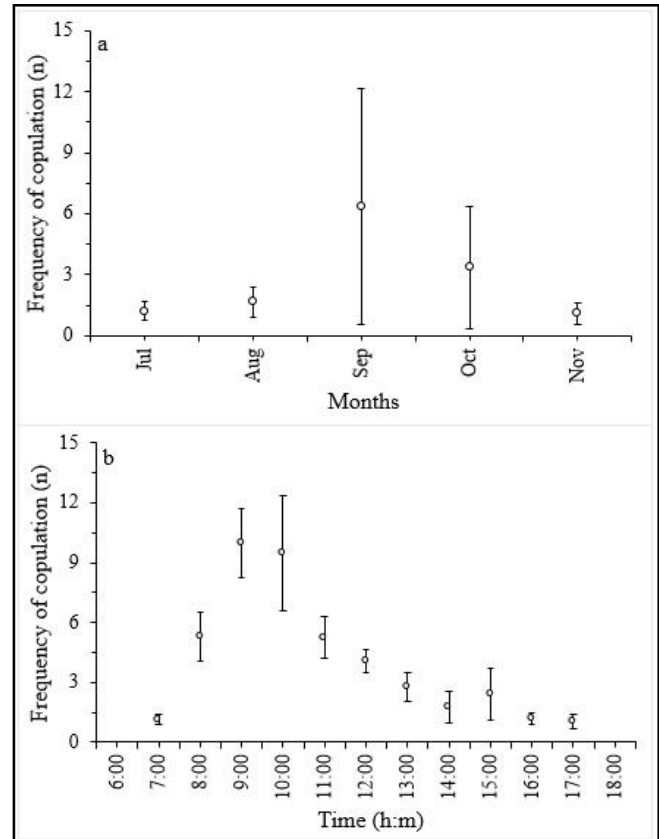


Fig.1(a): The frequency of copulation during the reproductive season of *Pteropus giganteus* and (b) : The pattern of reproductive activity of *Pteropus giganteus* at roost during day hours

The duration of vulva licking by a male was directly proportional to the duration and frequency of copulation ($r = 0.835$, Fig. 3). The copulation was observed from both dorsal and ventral side of the body (dorsal mounting in Fig. 2b). After the copulation, both the sexes were segregated from each other and settled for a while. They also engaged in grooming of genital organ, snout and patagium for an average 50.34 ± 9.84 sec (Fig. 2c). On various occasions, the potentially active male was exchanged the roost trees for exploring other mating opportunities while the female retained the same roost.

In the present, it was observed that the individuals of *P. giganteus* actively involved on copulation between July and November, while the peak copulation was observed during September (Mathur *et al.*, 2012; Maruthupandian and Marimuthu, 2013 and Baki *et al.*, 2015). The high frequency of copulation observed at forenoon suggest the existence of pleasant weather and biologically active period than afternoon. It may also be

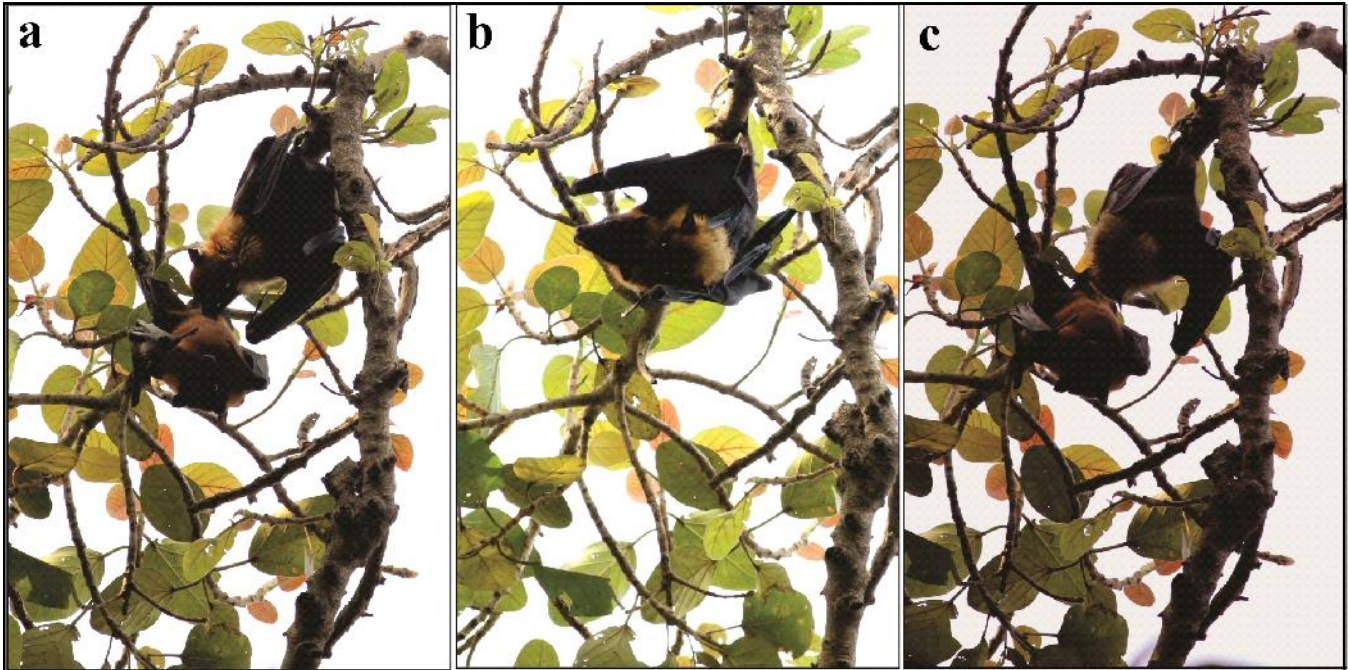


Fig. 2(a): Showed the reproductive activities of *Pteropus giganteus* during copulation such as vulva licking, (b) dorsal mounting and (c) grooming of body organs after copulation

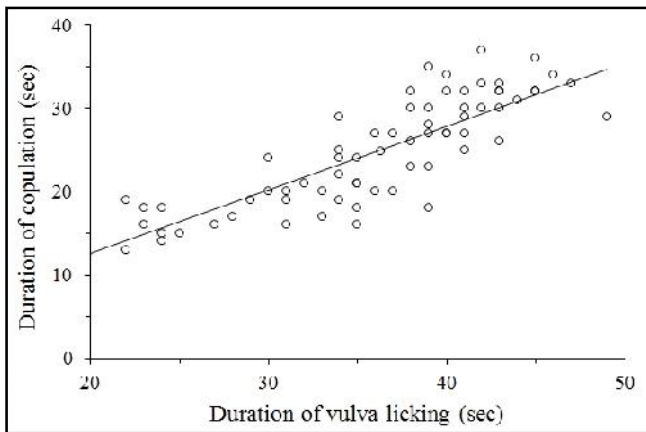


Fig. 3: The effect of vulva licking on copulation duration of *Pteropus giganteus*

a matter of physical fitness, as the bats accumulate higher energy after their home flight. Moreover, warm weather conditions favours reproduction and fetus development while hot and dry seasons inhibit the reproduction and even cause mortality in flying foxes (Welbergen *et al.*, 2008).

The exhibition of various behavioural activities such as wing stretching, vocalization and licking of genital region was commonly observed in this study. Generally,

male stretches wings for demonstration of its potentiality and attracting the females. The pre-copulatory activities had a significant impact on the duration of copulation. It suggests that males spent more body energy in pre-mating activities than in the rest of the social activities. Therefore, the physical strength of males has a crucial role in reproductive behaviour (Kyogoku, 2015 and Takakura and Fujii, 2015). It is obvious that the foreplay altered copulation and played a significant role in the reproductive aspects of bats (Tan *et al.*, 2009; Maruthupandian and Marimuthu, 2013 and Sugita, 2016). In the present study, it was also observed that *P. giganteus* copulates from both dorsal and ventral sides. Though body plan during copulation is the matter of change but it was not estimated that which axis is more viable however, copulation from both axes (e.g. dorsal and ventral) are well elaborated in various studies (Mathur *et al.*, 2012; Maruthupandian and Marimuthu, 2013 and Baki *et al.*, 2015).

The segregated mating partner grooms patagium, toes and genital organs independently which presumably provides enhanced reproductive fitness in *P. giganteus* (Maruthupandian and Marimuthu, 2013). The outcome of this study may pave various novel approaches on reproductive of *P. giganteus*.

COOPTED AUTHORS' –

RAM KUMAR AND DEEP NARAYAN PRASAD, Department of Applied Animal Sciences, Babasaheb Bhimrao Ambedkar University, LUCKNOW (U.P.) INDIA

LITERATURE CITED.....

Baki, M., Al-Razi, H. and Alam, S. (2015). Mating behaviour of the Indian flying fox (Chiroptera) in southern Bangladesh. *Taprobanica: JoAB*, **7**: 66-67.

Kyogoku, D.(2015). Reproductive interference: ecological and evolutionary consequences of interspecific promiscuity. *Popul. Ecol.*, **57**: 253-260.

Maruthupandian, J. and Marimuthu, G. (2013). Cunnilingus apparently increases duration of copulation in the Indian flying fox, *Pteropus giganteus*. *PLoS one*, **8**: e59743.

Mathur, V., Priya, Y.S., Kumar, H., Kumar M. and Elangovan, V. (2012). Reproductive behavior and population dynamics of the Indian flying fox *Pteropus giganteus*. *JoTT*, **4**: 2699-2704.

Shi, J.J.and Rabosky, D.L. (2015). Speciation dynamics during the global radiation of extant bats. *Evol.*, **69**: 1528-1545.

Sugita, N. (2016). Homosexual Fellatio: Erect Penis Licking between Male Bonin Flying Foxes *Pteropus pselaphon*. *PloS one*, **11**: e0166024.

Takakura, K. I. and Fujii, S. (2015). Island biogeography as a test of reproductive interference. *Popul. Ecol.*, **57**: 307-319.

Tan, M., Jones, G., Zhu, G., Ye, J., Hong, T., Zhou, S., Zhang, S. and Zhang, L. (2009). Fellatio by fruit bats prolongs copulation time. *PLoS one*, **4**: e7595.

Welbergen, J.A., Klose, S.M., Markus, N. and Eby, P. (2008). Climate change and the effects of temperature extremes on Australian flying-foxes. *Proc. R. Soc. Lond. B. Biol. Sci.*, **275**: 419-425.

