

## SOCIOBIOLOGY OF AN ALL MALE BAND IN HANUMAN LANGURS, *PRESBYTIS ENTELLUS* AROUND JODHPUR

LAL SINGH RAJPUROHIT

DEPARTMENT OF ZOOLOGY, J.N.V. UNIVERSITY, JODHPUR-342005, INDIA.

The genetically isolated population of about 1300 langurs (*Presbytis entellus*) around Jodhpur organised in unimale bisexual multimale bisexual and all male groups. The male band comprised of only males of different age classes except infants. The male infants are weaned earlier than female infants at about 13 months age (range 12 to months). These weaned male infants are expelled from bisexual groups and become members of all male bands. This sociobiological study (1983-88) suggest a definite social association among male langurs enabling them to live in harmony.

### INTRODUCTION

Bisexual troops of Hanuman langurs consists of adult females with their offsprings and either one (unimale troop) or more than one (multimale troop) resident males. Male bands comprise male members of different age classes except breast feeders. Solitary males are also rarely observed. There is a contradiction about the social organisation in the males of male band, Sugiyama (1964), Sugiyama et. al. (1967) and Mohnot (1984) considered them as need oriented loose gatherings. In present study of sociobiology of male langurs, a hypothesis about the male band has been developed that they have a definite social unit.

### MATERIALS AND METHODS

The study conducted at Jodhpur (the suncity, altitude about 241 m, latitude 26° 18' N and 73° 08' E), is located in the Great India Desert 'Thar'. The findings from date collected through *ad libitum*, scan sampling and focal animal sampling (Altman, 1974) in all the male bands in this population during 1983-88. The number of male bands during present study varied between 10 and 14 out of total 42 groups.

**Table I :** *Presbytis entellus*, minimum, maximum and average band size observed in seven censuses around Jodhpur (1983-86).

	Total male bands observed	Total males counted	Band size		
			Minimum	Maximum	Average
July 1983	11	130	4	32	11.8
April 1984	14	122	2	22	08.7
Nov. 1984	14	123	2	24	08.8
April 1985	10	149	7	42	14.9
Oct. 1985	13	160	5	47	12.3
April 1986	11	159	5	40	14.5
Oct. 1986	11	188	5	51	16.9

The habitat used by these langurs includes open Scrub forest, field, and orchards. Water is available to all group throughout the year from man-made ponds which collect rain water. The animal are well habituated due to provisioning by local people. For age categorisation physical

growth, genital development and incisor size were used as major criteria (cf. Rajpurohit & Sommer, 1991). The physical mark, scars, deformities or their typical moving and sitting postures were used to identify the focal animal.

## OBSERVATION AND RESULTS

### Origin and composition of all male bands

Male Juvenile (or weaned male infant) is the basic unit of male bands, which are ousted from bisexual troops from time to time. The male bands are fewer than the number of bisexual troops and are much smaller in size also. The Jodhpur langur population has an average troop size is 38.4 individuals (range 14 to 91) and average band size is 12.5 males (range 2 to 51). The mean number of males in each age class was : adults 45%, subadults 20% and juveniles 35% in male bands. The overall sex ratio during this study was 1 male : 1.8 females and in adults it reaches to about 1: 5.

### Weaning, expulsion and integration of male juveniles

Observation suggest that the weaning in langurs starts between the age of 7.4-10.0 months, average 8.8 months of age, and is completed in an average period of 4.2 months (range 3.2-5.5 months). The male infants are weaned early in comparison to female ones. After weaning, infants became independent and play vigorously which includes jumping, hitting, and pushing any member coming in the way except the resident male. The segregation of juveniles on sex basis starts at late weaning stage. The resident father may tolerate the activities of these young male and occasionally hit or threaten them the letter disturb their sexual interactions. The female juveniles are not observed interfering the resident's activities. On the other hand the non-father resident may become more aggressive and always tries to keep male juveniles away by threats, air bites, chasing etc. It does not mean that only non-father males oust the male juvenile, but in most of the cases it is like that and father resident observed tolerating in general. However, he was also very punitive in two cases and could expell the male juveniles. Therefore, the male juveniles in general have no alternative except to join a male band on their expulsion from their natal troops. And they may follow one of the following strategies: emigrate to bands as a unit after male replacement alongwith their presumable father (an ousted resident); join the bands where their presumptive father has already reached; or may join any male band available around. And they may form a separate unit with young adults, subadults and juvenile.

### Social organization in male bands

The bands members react to new coming juveniles without any antagonism. The subadult and juveniles of the band, greet the new juveniles by enclosing them in arms, 'kissing', embracing mounting and putting hands on the back and head.

*Daily schedule and movement* : A male band do not follow any rigid schedule as do bisexual troops. However the individual of male bands are more active in the morning (7.00 to 10.30 hrs) and evenings (17.00 to 19.00 hrs) and less so at midday and in the afternoon. Occasionally they may move at midday also. Their activity schedule may differ from season to season and even from day to day. Roosting sites of a male band is not permanent. In night there is no activity except some shift in positions. Generally they keep some distance between one another but in

winter juveniles may sit close or even huddle with subadult or adult members. The moving range of a male band is about 15-20 times large than that of an average bisexual troop has. During distant movement their feeding and roosting is highly disorganised.

*Intraband interactions* : Within the male band interactions among its individuals are usually peaceful without apparent agonistic behaviour. However, juveniles are more active and vocal, participate in a variety of play episodes. The subadult males are less active and vocal than juveniles but may occasionally intervene and intercept play of juveniles, undertake frequent mounting with thrusts and allow the juveniles to reciprocate. In general, juveniles do not interact with adult members of their band and keep distance. In case of father, they were observed very close without fear and even huddled with him in winter. The adult individuals of male band interact themselves in a different way depending on the situations. They may form variety of association like pairs, trios or even larger subgroups without any sign of antagonism. On the other hand, they may indulge in serious fight for approaching estrous females leading to physical injury while invading the bisexual troops. Interactions between two bands depend on the circumstances and the place of meeting. They were seen peaceful, but may become aggressive when encountered in and around the bisexual troops' range.

*Social communication* : In the langurs, social communication occurs by tactile, auditory and visual gestures and postures. The adult males give 'whoops' which are loud vocalizations given in various contexts. The other common auditory vocalizations are loud barks, grunts, canine grinding, coughing, alarm barks and screaming by younger, associated with specific gestures.

*Subgrouping in male bands* : It is a distinct tendency of the males of bands to split into 2 to 3 subgroups depending on the size of male band and the natural food available. The subgrouping is never permanent, as it lasts only for few hours to few days and seldom goes as long as one month. The observations suggest six types of subgroup formation in this population :

(a) of adult males; (b) of subadult males; (c) of adults and subadult males; (d) of adults and juveniles; (e) of subadults and juveniles and; (f) of adults, subadults and juveniles.

*Dominance hierarchy* : The rank order is well marked among the adult males of male bands. Displacement is a reliable measure to assess the status, which can be for procurement, for access to estrous females, or to occupy specific spatial location. When male band usurps the resident male of a bisexual troop, it is the alpha male of male band which acquires his (ousted resident's) position, i.e. become the resident male. The vacant position of alpha/beta male is occupied by the next ranking male and thus pattern of filling and elevating of rank goes on.

#### **Residency, resident male replacement and fate of an ousted resident male**

Residency is a form of possession of a bisexual troop or harem and resident male engages in sexual interactions with every estrous females available time to time in his troop. Resident male replacement occurs periodically in the bisexual troops. And male bands seems to play an important role in this social change.

*Resident male replacement* : Adult males of the bands keep watch on the activities of its neighbouring bisexual troops which are occasionally invaded by them. During invasion males often mingle with the bisexual troop females. Repeated attacks by band males or their continuous stay in the troop spark off aggressive interactions between the resident male of the troop and the

invading males. The resident male resist the invasions of all male band and may or may not succeed in holding the troop. The withdraw by a defeated resident follows with continuous agonistic interactions between the most dominant male (alpha) and the rest of the ranking males of band. It is he (an alpha male), who ultimately takes over as the new resident. After taking over, he drives out the dislodged resident and remaining males of his own band. In few cases, the multimale situation prevails for longer period even upto few months. The process of male replacement is either abrupt or gradual. Of 36 recorded resident male replacements during this study, 13 changes took less than 10 days in the whole process, and categorised as abrupt or sudden changes while 17 changes were of gradual nature in which the process prolonged for as long as 115 days. The nature of rest six male replacement were not known.

*Fate of an ousted resident male* : The 36 ousted resident males, were killed by invading males (n=1); become solitary (n=7); join male band (n=13); form new male band (n=2), or disappear (n=13) from the seen temporarily or permanently. No ousted male was ever seen regaining residency in his previous troop except two cases of an interim residency where the ousted residents repossessed their troops for few days.

*Male tenure* : It is the period from the day of onset of residency till the resident is dislodged or replaced by another male. The average tenure of residency in 31 cases (as the onset of 5 residencies is not know) was 27.6 months (range few days to 4 years).

## DISCUSSION

The uniformity over the year suggests that Jodhpur langur population is stable. The bias in sex ratio reaches about 1 male : 5 females in adults; which is significant for the concept of stable population (Rajpurohit & Sommer, 1991). However, the study do not suggest any correlation between the band size and the average number of adult females in bisexual troops. Similarly, the band size has no any influence on the frequency of invasion to the troops.

Weaning is a process in which the infants between the age of 11 and 15 months become independent from their mothers in langurs (Hrady, 1977; Roonwal & Mohnot, 1977; Sugiyama, 1964; Rajpurohit 1987). Weaning, however, is a stressful period for the infants since their mothers are often harsh and hostile toward them. It is otherwise an important process in which mothers by severing to enter into an independent stage and to prepare mothers to bear next offsprings. Male infants start weaning earlier and are weaned more quickly as compared to female by sex is that the male infant has to leave the natal troop in any case, so he may learn to live in absence of maternal assistance as early as possible. The expulsion of weaned male infants (male Juveniles) from their natal troops and integration into male bands, appears to be a regular phenomenon in this species, where unimale bisexual troop form predominates. By elimination, the male juveniles from the troops the multimale situation is prevented. Sugiyama (1964) observed that the multimale troop may arise because of the stable leadership by some males who are able to maintain the troop long enough for their own to mature.

The formation of temporary subgroups by subadults and juvenile males are probably influenced by factors like lack of their interest in adult activities, poor vitality or out of fear, or all together. The subgroup formation by adult male may influence by sexual urg and antagonism to avoid direct competition (also see Mohnot, 1984).

In Hanuman langurs around Jodhpur, a clear cut dominance hierarchy has been observed in the male bands (particularly among adult males), which appears to be a functional rank order (Rajpurohit, 1987). Sugiyama (1964). Sugiyama *et al.* (1965); Mohnot (1984) have considered the male bands less rigid organisations and are without any functional rank order. According to these long term data, the prime period of a male langur life is between 8 and 15 years of age. Sugiyama (1984), however, suggests that langur males are probably able to join the troop by about 12 years of age. There is no any fixed tenure of male residency but many field studies suggest that it is between 2.4 and 4 years, including the present study too. The only case of a resident being killed while ousted is reported. A continuous solitary life for ousted males seems rather disadvantageous, since it increases the probability of being killed while encountering a predator, decreases the chances for occasional invasions into bisexual troops and increases the probability of being excluded from a suitable (feeding and resting) area by rival males. After joining male bands, they co-operatively invade the troops, and can maximise their reproductive success. The formation of a new and separate male band by an ousted resident and juvenile males also seem not a successful strategy. It is thus clear that according to the social circumstances during the replacement process, the ousted resident may adopt various strategies after their ousting from residentship. There is a definite social association enabling males to live in harmony, and this association is best known as an "all male band".

#### ACKNOWLEDGEMENTS

The author is grateful to late Prof. M.L. Roonwal and Prof. S.M. Mohnot for their guidance and encouragement. He is thankful to Profs. K.N. Katiyar, S. Johnson, B.G. Kapur, S.C. Bhargava and H.S. Nama for providing working facilities. He is also thankful to Department of Environment & Forest, Government of India as he was a senior Research Fellow in this project.

#### REFERENCES

- ALTMAN, J. 1974. Observational study of behavior : Sampling methods. *Behaviour* **49** : 227-267.
- HARDY, S.B. 1977. *The Langurs of Abu*, Cambridge, Mass : Harvard, Univ. Press.
- MOHNOT, S.M. 1984. Some observations on all male bands of the Hanuman langurs, *Presbytis entellus*. In : *Current Primate Researches*. (Roonwal, M.L., Mohnot & S.M. Rathore N.S. Eds) Univ. of Jodhpur press, Jodhpur. pp. 343-356.
- RJPUTOHIT, L.S. 1987. Male social organisation in Hanuman langure, *Presbytis entellus*. Ph. D. Thesis, Jodhpur Univ., Jodhpur.
- RAJPUROHIT, L.S. & SOMMER, V. 1991. Sex differences in mortality among langurs (*Presbytis entellus*) of Jodhpur, Rajasthan. *Folia Primatol.* **56** : 17-27.
- ROONWAL, M.L. & MOHNOT, S.M. 1977. *Primates of South Asia : Ecology, Sociobiology and Behaviour*. Cambridge Mass : Harvard Univ. Press.
- SOMMER, V. & RAJPUROHIT, L.S. 1989. Male reproductive success in harem troops of hanuman langurs (*Presbytis entellus*). *Int. J. Primatol.* **10** : 293-317.
- SUGIYAMA, Y. 1964. Group composition, population density and sociological observation of Hanuman langurs. *Primates* **5** : 7-37.
- SUGIYAMA, Y. 1984. Some aspects of infanticide and intermale competition among langurs, *Presbytis entellus* at Dharwar, India. *Primates*. **25** : 423-432.
- SUGIYAMA, Y., YOSHIBO, K. & PARTHASARATHY, M.D. 1965. Home range, mating season, male group and inter troop relations in Hanuman langur (*Presbytis entellus*). *Primates*. **6** : 73-106.
- VOGEL, C. 1971. Behavioural differences of *Presbytis entellus* in two different habitats. *Proc. 3rd Int. cong. Primatol.* **3** : 41-47.