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Research Paper

RECENT CASE OF RESIDENT MALE REPLACEMENT FOLLOWED BY INFANTICIDE IN UNI-MALE BISEXUAL TROOP OF HANUMAN LANGUR (*Semnopithecus entellus*) IN JODHPUR (INDIA)

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Abstract

The present study reports on case an immediate resident male change and infanticide in a unimale bisexual troop of Kaga (B-11) around Jodhpur. The Hanuman langur (*Semnopithecus entellus*) population around Jodhpur is well studied during last four and a half decades. During May-July, 2015, we have conducted this study. This Focal group at Kaga having about 38 members including an adult male; 21 adult females, and others (juveniles and infants of both the sexes). The resident male was there for last about two and a half years. There are some 20-24 males in all-male band (AMB) nearby used to approach the Kaga troop occasionally. On July 15, 2015, there were six invading males approached the troop. However, the resident male tried his best to chase these invaders away but was not successful. And in half hours of violent fights, the bisexual troop's resident male was cornered by invading males. For whole day all these males remained mingled with troop. An ousted resident male was not seen again after 20th July, the only one of those six invaders observed as new resident male of Kaga troop. One case of infant attacks was observed after male replacement in a focal troop (B-11). The youngest male infant, about one month was killed by new resident male on an attack. The new resident male was obsered aggressive many of the time after these attacks and observed running behind female carrying black coat infant for these two months.

Key words: *Semnopithecus entellus*, bisexual troops, male replacement, Infanticide.

INTRODUCTION

The Hanuman langur, *Semnopithecus entellus* (Dufresne, 1797), is the most widely distributed of 19 non-human primate species found in the Indian subcontinent. It is a highly adaptable species (Roonwal and Mohnot , 1977; Wolfheim, 1983). Social units in langurs population include one-male bisexual troops troops and all-male bands. But some time multi-male situation was observed in langur bisexual troops are generally matrilineal, with females remaining for life in their natal troops and with males emigrating, usually as juveniles, to join unisexual units (i.e. all-male bands). Resident males of troops are usually replaced after 2.5-3.0 years of tenureship, ranging from 3-60 months (Rajpurohit, 1987; Mohnot, et. al ,1987; Sommer, and Rajpurohit, 1989; Rajpurohit and Sommer, 1993). Generally two types of resident male

replacement processes have been reported i.e. immediate (abrupt) changes and gradual male change (Rajpurohit,1987). At the time of process of an adult male replacement, the resident is first driven out by invading males of an all-male band. A variety of social changes are met in langur species. Resident male change or replacement is one such important social change, periodically seen in the unimale bisexual troops. The present study describes the process of adult male replacement in focal troop Kaga (B-11) followed by an infanticide in langurs at Jodhpur.

Infanticide has been observed in many mammals including several primate species (see Hrdy, 1979; Hansfater & Hrdy, 1984). Infanticide after adult male replacement in Hanuman langurs have been reported at several study sites in India: Dharwar (Sugiyama, 1965), Jodhpur (Mohnot, 1971; Sommer & Mohnot, 1985; Makwana, 1979; Rajpurohit et.al.,2003; Agoramoorthy & Mohnot, 1988; Sharma, et al. 2010; Rajpurohit & Chhangani 2003), Mount Abu (Hrdy, 1974), Kanha (Newton, 1986). It is notable that all the study sites where male replacement and infanticide has been reported, the bisexual troop structure was either predominantly one-male or after the take-over (resident male change) seemed to be functionally one-male. Hrdy's hypothesis that infanticide has evolved primarily to procure reproductive advantage to males has received much attention. A new resident male could speed up the mother's sexual receptivity by eliminating young infants unlikely to be his own, so that she could then bear his offspring (Hrdy, 1974). The second important theory suggests that an infanticide male might kill infants in order to increase the resources available for himself (Rudran, 1979). This study proposes a 'terror strategy' hypothesis just to explain the show/exhibition of the male potentiality to rival males as well as to troop members. The present study reports on one case an immediate resident male change and infanticide in a unimale bisexual troop of Kaga (B-11) around Jodhpur (Fig. 1).

MATERIAL AND METHODS

The demographic study on Hanuman langur, *Semnopithecus entellus* Dufresne, (1797) at Jodhpur, Rajasthan (altitude 240 msl, latitude 26º 18'N, longitude 73º 08'E). The number of langurs living in this genetically isolated population of Jodhpur, within a total area of about 150 sq. km., fluctuated between about 900 (10), 1300 (Mohnot, et. al 1987; Rajpurohit,1987) to about 1950 individuals (Mohnot, 2000). The recent survey and census of the Jodhpur langur population (i.e. during April-May, 2015) revealed that there are total 2467 langurs counted in this isolated population of langurs. The population of langurs here is comprised of 38 bisexual troops and 16 all-male bands.

Data collection commenced when the animals no longer fled or hide in response to the appearance of observer, and continued with normal activities. By that time, most of the group members (particularly adults) could be individually identifiable. Observations were concentrated focal animal using *ad libitum* and focal animal sampling methods (Altman, 1974).

Study group

The present study deals with a unimale bisexual troop of Kaga troop (B-11). One of the field site of Jodhpur study area, which is 3 km North-East to Jodhpur city (see Fig.1). This troop having 38 individuals (i.e. an adult resident male, 21 adult females and 16 juvenile and infants of both the sexes and of different ages). In the last week of January, 2015, focal troop was seen normal. They are occasionally fed by the people from the city. Being not much vegetation around, Kaga troops animals are much more dependent on provisioned food in comparison to natural vegetation.

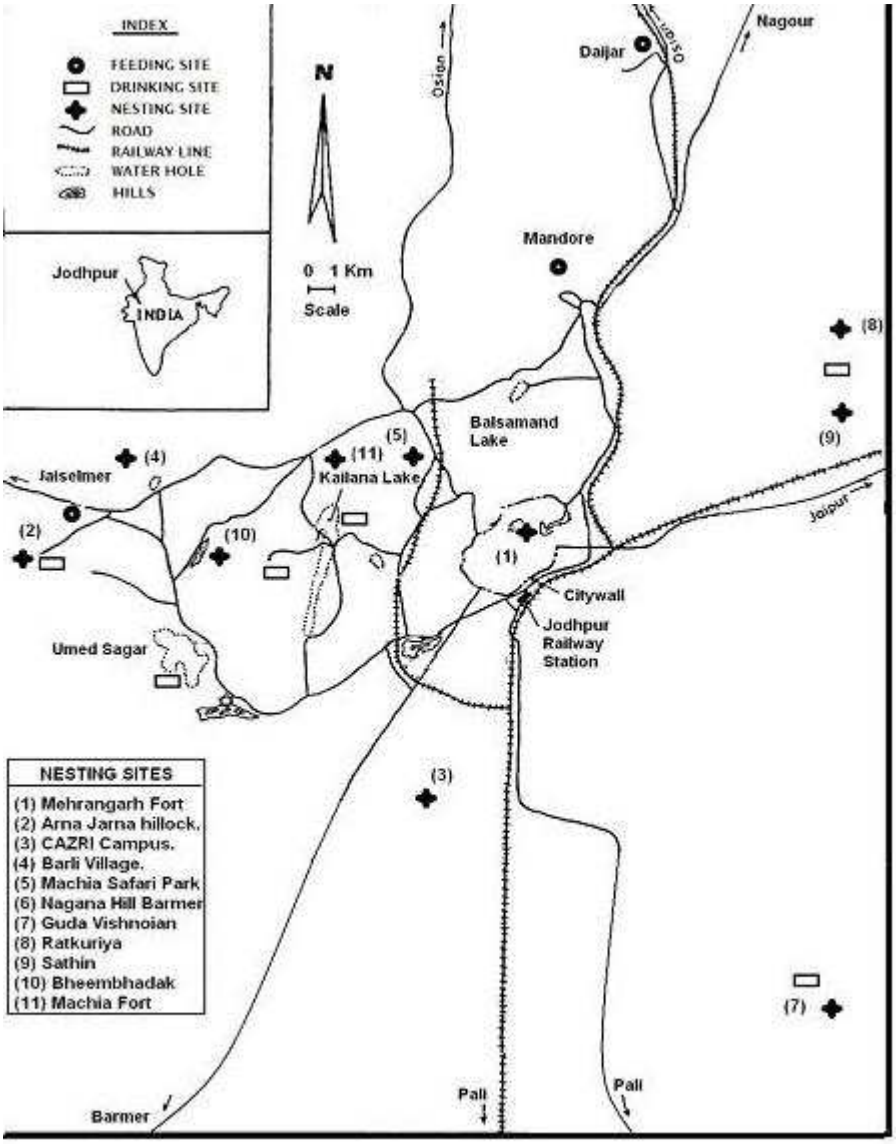

Fig 1. Location of Nesting, Feeding and Drinking sites for Egyptian Vulture in and around Jodhpur, India

OBSERVATIONS AND RESULTS

Aggressive interactions between all-male bands members and resident male of Kaga bisexual troop B-11 began on the afternoon of 11 July 2015. That time six males from all-male bands (AMB-5) interacted with troop B- 11. On July 20, the Kaga bisexual troop B-11 (resting on the Kaga Hill near Shitlamata temple), the adult male M 11 had been resident for about last 2.7 years and perhaps longer, as there were 2 subadult male and 10 weaned juvenile males ranging in age between 12 and 28 months.

All 10 male juveniles may have been the sons of resident male, but the subadult males (about or over 3 years of age) may not have been his son. Due to some reason tolerated by Alpha male following his take-over of the group, as he is the only male of his age.

There was one male bands present in this area, AMB-5 regularly interact with bisexual troop B-11. On July 15, 2015, the resident male M-11 of Kaga troop B-11 had been replaced, and new males of the male band AMB5 (1 old adult and 2 subadult) were in possession of the Kaga troop.

Replacement had occurred during the observer absence, between July 14 and 15 2015. The troop's members showed signs of disturbance and the females had hidden themselves among bushes and rocks. The former resident male of Focal troop was missing.

On July 16, 2015 in morning at 6.00 am troop B-11 was found in the possession of 3 males from male band AMB-5, but females were observed chasing them. At 7.30 am, 12 langurs females were sighted on a Kaga hill to the east. That time, new resident male was seen sitting near hill. A few minutes later, an exchange of aggressive convulsive threats and teeth-grinding between new resident male and former resident occurred for 20 min, without any physical contact. Then former resident male moved away from site.

Following the reinvasion of new adult male on 16 July, a fight occurred between former resident male and new invading male. After that on next day, former resident male of Kaga troop was disappeared. On July 16, 2015 troop B11 was found to be peaceful, but the some females were still frightened and continued to hide along with their dependent infants. There were 2 black infants of ages between 15 and 25 days. The former resident male kaga troop was on the hill to the east for one day.

The new resident male found to more aggressive and started jumping, whooping and biting the air in response to the previous resident male. That time in focal troop B-11 having multi-male stage continued for 3 days. After 3 days on 19 July three males of male band were never seen again in the area. After 19 July, 2015 next morning in 20 July troop B-11 was found in a settled condition and a new resident male (the highest-ranking male of male band AMB-5) was in possession. The other 3 males from this band were not found in the area. Some adult female from B-11 approached the new resident male of focal troop and performed head-shaking sexual presentation toward him, but sexual interaction did not occur.

Infanticide in troop B-11

The new resident male was seen normal on 21 July and three (two males and one female) Black coat infants were safe with their mothers. On July 22, 2015, at 7.00 the troop B-11 found on hill near mother temple at Kaga. Today, we did not see the youngest male infant (black coat) with its mother. We looked around but the one black coat infant was missing. Then we cheeked and searched missing black coat infant and found that having an injury on right buttock. Mother was observed not allowing infant to go apart from her lap. The new resident male seen very aggressive, two females observed to the resident male.

On July 23, 2015, at 7.30 am, the new resident observed with troop B-15 which was found on Hill. We saw a dead infant lying on top of hill. And also found female 3-4 sitting close to that dead black coat. This female might be mother of that victim black coat, most probably killed by the new resident.

Now the new resident male was nearly accepted by the females of this study troop. But still the two other black coat and white coat mother was seen keeping distance with him. The resident was observed bit violent on few occasions but seen attacking the only infant available in the troop again.

DISCUSSION

Replacement of Alpha male is one of the most important social changes after two and three years seen periodically in Hanuman langurs. Large numbers of authors have reported such replacement in langurs (Jay, 1962: Hrdy, 1977; Mohnot, 1971, Sugiyama, 1965, Makwana and Advani, 1981, Rajpurohit 1987; 1991 and Sharma et. al, 2010).

Sugiyama (1965) study case of adult male replacement in Dharwar, the usurping male drove the resident adult and immature males from the group and killed infants still dependent on their mothers. Mohnot, (1971) and Hrdy, (1977) observed similar replacement accompanied by infanticide case among Hanuman langurs at Jodhpur and Mt. Abu. (Rudran, 1973) reported

male replacement in purple-faced langurs in Sri lanka. Sharma (2010) also repotted case of infanticide after resident male replacement in Jodhpur. He did report male attacks on infants, however, large number of infants disappeared from natal group in which male changes occurred. In accordance with all the above reports and suggestions, the present observation, suggested that forcible adult male replacement may play a crucial role in maintaining the one-male troop structure in langurs population. In present study, the process of takeover and replacement of resident, new male taken place within a period of two or three days. However, these types of abrupt resident male replacements are not very common in the species.

One most common hypothesis suggests that infanticide results in increased reproductive output for the new resident male. This is the sexual selection hypothesis in support of infanticide. Hence infanticide behaviour is selected for (Hrdy, 1974, 1977). Leland *et. al.* (1984) suggest that infanticide behaviour is more likely to occur in one-male groups than in multimale groups. In groups which having more than one adult male, paternity may be confused and possibility may increase that more than one male may defend an infant from attack and the chances of an infanticide male siring the mother's next infant are lower than in an one-male groups. Hence the costs of infanticide are increased, whereas the benefits are decreased in groups of multimale situation. Although, the present study found infanticide attacks occurred in a one-male situation.

Curtin and Dolhinow (1978) suggested that infanticide is linked to an unnaturally high primate population density brought about by human disturbance. However, other studies have seen infanticide in undisturbed populations of langurs (Newton, 1986) and other primate species (Struhsaker and Leland, 1987). Present study offers little support for the social pathology theory. Although the Jodhpur langur population is found near human habitation, the density of langurs in the area (appx. 14.5/km^2, this study and Rajpurohit *et.al.*2003) is not high.

Another hypothesis by Rudran (1979) suggested that an infanticide male might kill new born baby in order to increase the resources available for himself. Hypothesis does not explain why the male attacked the youngest infant (the animal consuming the least resources) but not older infants and juveniles who consume more (Hrdy, 1977; Sommer and Mohnot, 1985; Agoramoorthy and Mohnot, 1988).

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