ASSOCIATION OF RHESUS MALES WITH A LANGUR GROUP

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Introduction

Polyspecific association among non-human primates occurs due to food or protection against predation or both. In some cases, it may be a chance phenomenon also (Struhsaker, 1981). Polyspecific association among non-human primates has been reported from a number of study locales which represent almost all the areas of zoogeographic distribution of primates viz. Africa (Struhsaker, 1975; Waser, 1980; Oates and Whitesides, 1990), Asia (Bernstein, 1967; Newton, 1984, Mathur *et al.*, 1990), South America (Klein and Klein, 1973; Bernstein *et al.*, 1976).

Earlier works on inter-taxa association in Langurs (*Presbytis entellus*) describe their interaction with dogs and cows (ticks and lice eating respectively) (Mathur *et al*, 1990), Deer (predator detection by their association and feeding on fallen leaves by Deer) (Howe, 1981), Peacock (Predator detection) (Jay, 1965), Bugs (feeding association) (Newton, 1984), Snakes (panic reaction in Langurs) (Makwana, 1977), goats (grooming) (Hardy, 1977), Nilgiri Langurs (*P. johnii*, natural hybrids) (Hohmann, 1991), Tiger (predation) (Israel and Sinclair, 1989), Leopard (alarm call response) (Jay, 1965) (alarm call and mobbing) (Ross, 1993) and Wolf (alarm bark, mobbing the silent wolf and fleeing on wolf's reaction) (Manohar and Mathur, 1986).

With Rhesus, previous studies include work of Jay (1965) on grooming of Langur female by an adult Rhesus female and association of Rhesus heterosexual pair with a Langur group, empirical observations of various age-sex classes of two genera (Manohar, 1989), prolonged association of a single male Rhesus with a Langur group (Roonwal and Mohnot, 1977), coexistence particularly in giving and responding to each other's alarm calls (Pirta, 1984) and Langur female feeding milk to Rhesus infant (Das and Sharma, 1980).

The present paper is concerned with departure of Rhesus males from one Langur group to another and interaction with the new Langur group members.

Methodology

Primates at and near Jaipur city are being studied for the last more than a decade by this research group (Wolfe and Mathur, 1988; Mathur *et al.*, 1990; Mathur and Manohar, 1990 a,b, 1992, 1994 a,b).

(i) *Study area* : Study locale was Ambagarh Reserve Forest, about 7 km from Jaipur (75°55'E, 26°55'N) in North India. The forest reserve has three distinct seasons viz. winter, summer and monsoon. There is a village and a few temples in the area. Monkeys are provisioned with food by devotees on auspicious days.

(ii) *Recording of observations* : While studying mother-infant relationship and related aspect in Langurs (*Presbytis entellus*) at Ambagarh Reserve Forest near Jaipur between September 1988 and April 1991, observations were made on a rare and prolonged Macaque-Colobine association of significant interest, using ad libitum method (Altmann, 1974) which is used to record rare events of significant nature.

The animals involved in present study were individually identified and were habituated to researchers. Relevant contextual parameters are presented in Table 1.

Table 1

Relevant contextual parameters

No. of Rhesus groups	5
No. of Langur groups	7
Area of Reserve forest	7.5 km^2
Density of Rhesus	20 per km^2
Density of Langur	66.60 per km^2

% of group overlap of Langur group G III with adjacent Langur group G IV - 66.66%
% of aggressive interactions of above two groups - 30%

Group composition of G III (Langur) :

Adult male	Adult female	Sub-adult female	Juvenile	Infant	Total
1	49	7	34	27	118

Group composition G IV (Langur) :

Adult male	Adult female	Sub-adult female	Juvenile	Infant	Total
1	43	12	16	30	102

Social type of G III and G IV groups - Unimale bisexual i.e., one adult males several females and their infants, (Roonwal and Mohnot, 1977)

Degree of provisioning by devotees in G III and G IV - Heavy (Mathur and Manohar, 1986)

Predator : Dogs
Vegetation type : Dry-deciduous

Results

A Rhesus (*Macaca mulatta*) bisexual pair intruded into a unimale bisexual Langur (*Presbytis entellus*) group G III in December 1985 (Mathur and Lobo, 1989). The pair later resulted in a small group of Rhesus (Flow Chart 1).

Observed interaction of Rhesus males with Langur group G IV can be classified as follows :

1. Mounting, grooming and aggression (Table 2).
2. Assistance by Rhesus to Langurs of G IV group in interacting with intruding Dogs and Langurs (Table 3).
3. *Response of Rhesus male to an* electrocuted Langur female of G IV group is described in a chronological fashion in Flow Chart 2.

Discussion

Langur as well as Rhesus are eurytopic species (Roonwal and Mohnot, 1977) with considerable overlapping of the area of geographical distribution. Sympatric species are likely to interact. In the present case, interaction between Rhesus and Langur was likely as Langur density was quite high in the Reserve Forest (Table 1).

Range of duration of interspecific interaction among primates can vary from

Table 2

*Mounting, grooming and aggression in Rhesus - Langur interaction**

Type of observed interaction	Individuals involved		Remarks
1. Grooming (Fig. 1) (n=27)	Groomer Rh1 Rh2 L1 Rh3	Groomee L1 Rh1 Rh2 L1	Approximate duration of grooming sessions was from few seconds to 8 minutes or more.
2. Mounting (n=53)	Mounter Rh1 Rh2	Mountee L1	Pelvic thrusts (approx. 2-7) and foot clasp was used. L1 did not present to Rh1 or Rh2 for mounting. L1 did not present to Rh1 or Rh2 for mounting by raising her hind-quarters and head shaking.
3. Aggression (n=5)	Rh2 barking and chasing at L1 (Simply runs away)		

*On a few occasions (n=3), when Rh1 and Rh2 mounted L1 (Langur adult female without infant), other Langur adult female has been observed to react to mounting Rhesus (mounter) by barking (in case of Rh1), harassing (Rh2) and pushing the back of Langur female L1 (mountee).

Table 3

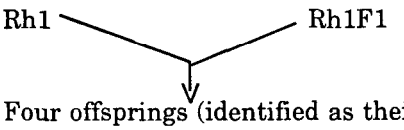
Assistance by Rhesus males to Langurs of group G IV

Behavioural Event/State	Role of Rhesus	Remarks
April 1990,Approach of a dog	Rhesus (Rh2) reacted aggressively towards the dog, the latter ran away, Rh2 followed dog and mounted it.	
7 May, 1990, Langur males from an all-male band intruded G IV group	Assisted in threatening and chasing intruding Langur males (IL Ms) during fight between ILMs and M4 (Resident leader of unimale bisexual Langur group, G IV).	
Mid-1990, All-male Langur group, AM I started interacting with G IV by coming in its home range	ILMs were chased away by M4 and 3 Rhesus males. There were fighting of ILMs with M4 Rhesus and Langur females including those with infants.	Due to fighting, M4 was badly injured on right upper arm and chased away by ILMs on 23 August 1990; Rhesus male (Rh2) also injured on forehead; some Langur females including those with infants and ILMs also injured. New Resident Langur Male, M5, established on 07 January 1991. Transition period = 137 days (date of M5 establishing itself- Date of M4 ousting).
Mid-1990, Approach of two dogs (a ground mammalian predator)	Rhesus males (Rh1 and Rh2) chased dogs.	
September 1990, A male Langur juvenile badly wounded on its face, was attacked by a dog.	Both Rhesus and Langur jointly mobbed the dog (surrounded the dog from a height of about 2.5-3.5m on tree and barked at it)	Juvenile Langur managed to climb a tree nearby and the dog moved away.

Flow Chart 1

Development of association and activities of Rhesus living with Langur group G III and G IV

Parent Rhesus male Rh 1 and parent Rhesus female Rh1F1 joined Langur group G III in December 1985.



Four offsprings (identified as their progeny as born due to mating between Rh1 and Rh1F1 in Langur group G III and associated with mother since birth).
developing into :

Rhesus adult male Rh2
Rhesus adult male Rh3
Rhesus adult female Rh2F2
Rhesus juvenile Rh4
Lived with Langur group GIII from December 1985 through October 1989.

Split in November 1989

Rh1, Rh2 and Rh3	Rh4, Rh1F1 and Rh2 F2
(Always roost and generally remain with Langur G IV; occasional visits to home range of Langur group G III for foraging and social interaction)	(Always roost and generally remain with Langur G III, occasional visits to home range of Langur group G IV for foraging and social interaction)

very brief encounters in feeding trees (measured in minutes) to relatively permanent formation (measured in years) (Waser, 1986). On this continuum, the present association seems to be a case of long-term association. Earlier works on Rhesus-Langur interaction (with the exception of Manohar, 1989) offer little or no explanation for the events observed by the authors. In the present study, Rhesus males (Rh1 and Rh2) have been observed to groom and mount Langur female and Langur female was observed grooming these two Rhesus males. Grooming serves three roles in Rhesus consorts :-

(i) As a means of displaying affection
(ii) To strengthen the social bond

Flow Chart 2

Response of Rhesus male to an electrocuted Langur female of G IV group

0800 hrs. A sub-adult female Langur, was hung on electricity wire with its face towards the ground.

0830 hrs. Rh1 reached near the wire by climbing on a concrete structure (a dome) and examined hind parts of the electrocuted Langur, pulled its tail and after a while, its forearm. Then, it sat on the dome.

0910 hrs. Rh1 tried pulling Langur's leg but could not move the dead Langur.

0918 hrs. Rh1 once again pulled Langur's tail. Till 0923 hrs Rhesus kept pulling one or the other body part of the Langur and then Langur fell down on the ground from a height of about 4.5 - 5.5m.

0925 hrs. Rh1 descended from dome and examined the dead Langur by turning it over. Rhesus tried to drag the Langur but could not. Rhesus then left and sat away from the dead animal. An adult female Langur approached and examined the electrocuted Langur by touching, sniffing and turning it over, whereas some other Langurs just looked at the dead conspecific.

0936 hrs. Rh1 came back and tried to drag the electrocuted Langur once again by pulling its tail but abandoned its effort after a few unsuccessful trials.

(iii) To sexually arouse the partner (Agar and Mitchell, 1975).

In grooming (when groomer is Rhesus), the first three statements seem to be plausible while grooming of Rhesus by Langur female can possibly be explained by first two statements. Mounting may occur in sexual interaction, as a greeting response, as an indication of dominance or as a way of redirected aggression (Agar and Mitchell, 1975). In case of mounting of Langur female by Rhesus, first two reasons are most likely and mounting of dog by Rh2 is a case of redirected aggression. Mounting of Langur by Rhesus and not vice-versa may perhaps be due to relative dominance of Rhesus over Langur, more adaptable nature of Rhesus and lack of sufficient access to non-kin Rhesus females (particularly in case of Rh2).

This inter-taxa association gives rise to questions detailed below :

(i) ***Why join a Langur group instead of living away from them ?***

Potential advantages for species involved in interspecific associations usually fall within two broad categories : foraging advantages and predator avoidance (Whitesides, 1989). The Rhesus seems to have easy access to preferred sources of

Fig. 1

Langur Female grooming a Rhesus male

food due to its dominance over Langurs (Southwick *et al.*, 1965; Jay, 1965). Therefore, Rhesus pair possibly drew benefit from an increased probability of detecting predators by associating with a large Langur group, G III (118 individuals, Mathur and Lobo, 1989). After leaving Langur group G III Rhesus males did not join another Rhesus group for the very same reasons they left their parent Rhesus group. They also did not join an all male Langur group living in the vicinity because in such a group there are no Langur females available for mounting and grooming.

(ii) ***Why did they leave G III to join G IV?***

As fitness is reduced by consanguineous inbreeding (Ralls and Ballou, 1982; O'Brien and Evermann, 1988), evolution of such mating strategies might have been favoured by selection that minimizes the occurrence of mating between close relatives in multi-male/multi-females primate groups (Smith, 1995). In a study of Rhesus in captivity, Smith (1995) found that intensity of avoidance of inbreeding was correlated with the degree of kinship between animals, which itself is perhaps correlated with levels of social experience, hence familiarity (Pusey, 1990). However, this needs to be confirmed by field studies on Rhesus (Smith, 1995).

As field observation in the present study shows that offspring Rhesus individuals are direct descendants of their parents, there was a clear need to reduce chances of inbreeding by moving on to an appropriate new Langur group (although, Rhesus males and Rhesus females maintain social bonds by coming to GIII and G IV

respectively). Thus, as Rh2 and Rh3 were growing up and living alone would not have been safe due to predators (Table 1), the Rhesus males left the Langur group G III (unimale bisexual type with 118 individuals) to join another Langur group G IV of some type (unimale bisexual) and of nearly the same group size (102 individuals), the levels of provisioning has been rated as heavy in these groups (Mathur and Manohar, 1986) and therefore, it was also advantageous for Rhesus as they could have easy access to provisioned food. With G IV, the Rhesus males had not only easy access to natural and provisioned food but also the advantages of living with a social group (Manning, 1972), which would not have been available when living along or by joining any solitary Rhesus. The former advantages accrue to Rhesus males due to its dominance over Langurs (Southwick *et al.*, 1965; Jay, 1965). Furthermore, Rhesus were familiar with the group as the two groups overlapped often and majority of the encounters were non-aggressive (Table 1).

This association obviously has a cost-benefit dimension which can be described as follows :

(a) *Advantages to Langurs* : As is clear from results of this study, Rhesus assisted Langurs in crisis situations (Table 3).

(b) *Advantages to Rhesus* : Rhesus had benefits of living with a social group as described by Manning (1972).

(c) *Disadvantages to Langurs* : These include stress due to aggression of Rhesus directed at them, reduced access to places of shelter and provisioned as well as natural food. Effect of some of the alarming behavioural activities of Rhesus on Langur mother-infant dyads has been described empirically (Bhatnagar, 1994).

(d) *Disadvantages to Rhesus* : There has been loss in opportunities to interact and mate with a wide range of conspecifics. While living with Langur group, they are involved in aggressive behaviour with Dogs and Langurs (both male and female) and are subjected to stress and risk of injury and mortality (Flow Chart 2 and Table 3).

The action of Rhesus to assist Langurs in crisis situations (Tables 2 and 3) has a survival value for Rhesus (despite the risk involved) as well as Langurs as by ensuring survival of Langurs, Rhesus will continue their association with Langur group and hence get all the benefits of this association.

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SUMMARY

A rare and prolonged intergeneric association between Rhesus and Langur was observed at Ambagarh Reserve Forest, Jaipur, Northern India. Behavioural observations include grooming of Rhesus males by Langur female and vice-versa and mounting Langur female by Rhesus males.

This interaction appears to have a cost-benefit aspect. Advantages to Langur and Rhesus were : assistance to Langurs by Rhesus in crisis situations and benefits of living with a social group to Rhesus. The likely costs to Langurs included stress due to aggression of Rhesus and reduced access to places of shelter and food. Rhesus had the loss in opportunity to interact and mate with a diverse range of conspecifics and stress along with possible brisk of injury and mortality while interacting with dogs and Langurs.

लंगूर समूह के साथ कपि-नरों का साहचर्य

पी०एस० भटनागर व आर० माथुर

साराशं

अंबागढ़ संरक्षित जयपुर, उत्तर भारत में कपियों और लंगूरों में एक दुर्लभ और दीर्घकालीक अन्तर जातीय साहचर्य होता देखा गया । आचाणा गत प्रेक्षण में लंगूर मादाओं और कपि नरों में समागम होता और उससे उलट भी होना सम्मिलित है तथा लंगूर मादाओं पर कपि नरों को चढ़ते पाया गया । इस अर्न्तक्रिया का एक लागत-लाभ पक्ष भी रहता प्रतीत होता है । लंगूरों और कपियों को इसके लाभ हैं, संकट आ पड़ने पर कपियों द्वारा लंगूरों की सहायता तथा कपियों का सामाजिक वर्ग में रह पाने का लाभ । लंगूरों को इसमें लगने वाली संभावित लागत है, कपियों द्वारा हिंस्रता दिखाने से पड़ता दबाव तथा आश्रय और भोजन मिलने के स्थानों तक पहुंच में होने वाली कमी । कपियों की अन्तर्क्रिया करपाने के अवसरों तथा सजातियों के साथ वैविध्यपूर्ण समागम में भी कमी आती है तथा अन्तर्क्रिया के कारण कुत्तों और लंगूरों के साथ हुए झगड़ों में क्षति पहुंचने या मर जाने तक में संभावित खतरों में पड़ने से उन पर दबाव बड़ जाता है ।

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