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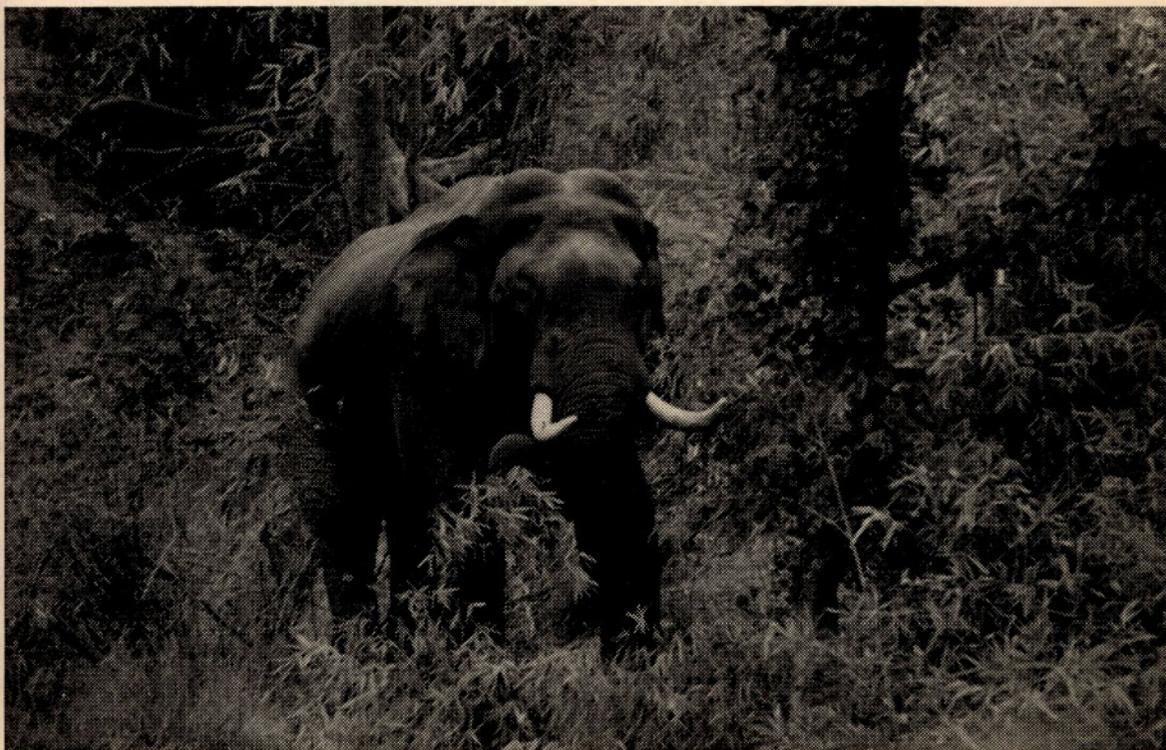
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*Elephas maximus*



"but the big is also beautiful"



A large heap of Rhinoceros dung—(For reference see Article 1, Page 1)

### **INFORMATION**

The members are hereby informed that new and attractive metallic badges of the Wildlife Preservation Society of India have now been received. Members are requested to purchase the badges as early as they can. The price of the new metallic badge is Rs. 10/- per piece. Since the stock is limited, the members are requested to hurry up.

—Honorary Secretary

### **REMINDER**

Members who have not paid their subscription for the year 1993-94 and 1994-95 are required to clear the dues by 30th June 1995.

#### **Request**

The subscription for the year 1995-96 has also become due. Members are requested to send their subscription by 30th September 1995.

—Honorary Secretary

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### SOME NEW ASPECTS OF PRE AND POST DEFECATING BEHAVIOUR ASSOCIATED WITH SCENT MARKING RELATIONSHIP IN GREAT INDIAN ONE HORNED RHINOCEROS

By

Amal Bhattacharya

#### Summary

*Indian rhinos are used, occasionally, to do some unusual pre and post defecating behaviour iike change of tracks, earth and dung scraping, foot dragging etc. apart from normal behaviour. Each such behaviour is expected to have some related reasons i.e. either hiding or exhibiting themselves. The dung piles are usually made by the defecations deposited by different individuals of different age classes. The rhinos possibly do communicate among themselves by dispersing scent in air either from pedal scent gland or from deposited dung and urine.*

#### Introduction

The Great Indian rhinoceros (*R. unicornis* L.) has a peculiar defecation behaviour by making large dung piles in some selected spots and using the same defecation places over and over again. It is assumed that the sight<sup>1,8</sup>, scent or both, of the previously deposited dung or dung piles stimulates them to defecate. Sometimes, the released odour of the dung leads them to move towards the dung piles. This uncommon behaviour, i.e., common sharing of the same dung pile with selection of defecation spots, is thought to have some deep relation for exhibiting self existence to other individuals. Defecation habit is known to have been reported on Indian<sup>6,10,17</sup>, Sumatran<sup>4</sup>, Javan<sup>13</sup> and African black<sup>7,9,12</sup> and white<sup>11</sup> rhinoceros. In the present study, some new interesting pre and post dropping behaviour patterns of Indian rhinoceros which were paid little attention before have been reported. Selection patterns of new and previous dunging areas for defecation according to their

choice which may have some scent marking relationships among the individuals have also been reported.

### Study Areas

During the year 1981 and '82 a comprehensive study on the different aspects of defecation behaviour of the Great Indian one horned rhinoceros was carried out at two small eastern sub-Himalayan wildlife sanctuaries, Gorumara ( $26^{\circ}40'N$ ,  $89^{\circ}00'E$ ) and Jaldapara ( $25^{\circ}68'N$ ,  $89^{\circ}55'E$ ). It was a part of broader field study of the ecology and behaviour of the animal. The study areas were selected because they had not been much exploited before. Laurie did an extensive field study on rhinoceros at Royal Chitawan National Park in Nepal<sup>10</sup>. The well known homeland of rhinoceros, Kaziranga, has also been explored from time to time by many field workers. Considering the habitat differences of the selected areas, some new findings, particularly in respect of food preferences<sup>3</sup>, habitat use pattern, home range<sup>1</sup> and so on were expected.

Gorumara is located at the confluence of Murti and Jaldhaka rivers whereas Jaldapara lies at the footplain of river Torsa<sup>15</sup>. Jaldapara sanctuary has got a shape like a trouser owing to the rapid encroachment by the villagers (most of them are refugees, displaced from Bangladesh) from the southern side resulting in a very long boundary leaving no buffer zone. Rhino concentration is found to be much high in its two legs. Gorumara has a unique buffer zone, at its north and south sides. Eastern side is guarded by river Jaldhaka, although in dry months it becomes easily accessible to the neighbouring villagers. The western side has a narrow tapering end, less than half a kilometre wide and guarded by Chalsa-Maynaguri Highway.

Gorumara is predominated by sal (*Shorea robusta*) forest while most of the Jaldapara area is occupied by mixed riverine forest consisting of sissou (*Dalbergia sissoo*), sirish (*Albizzia lebbek*), Khair (*Acacia catechu*) etc. interspersed by grassland meadows. Both the sanctuaries are located in Jalpaiguri district of West Bengal. Nearest airport is Bagdogra for both the sanctuaries. Nearest rail stations are Chalsa and Hasimara for Gorumara and Jaldapara respectively.

### Methods

Mainly the tracks and other traces of rhinos near the dungpiles were analysed to reconstruct the defecating behaviour. The rhinos observed near the freshly deposited dungheaps were considered as the individuals making the depositions. Mostly the individual identifications were based on size and peculiarities of their hind footprints<sup>3</sup>. The size and shape of the hind footprints close to the freshly deposited dung were recorded and rubbed off afterwards to avoid repetitions. Besides this, the measurement and weight of the dungballs were also taken into account as the identifying characters of the different

age classes. Individual identifications were not possible by measuring the dung balls. At first all kinds of depositions were noted and were classed either as dungpiles or single defecations. Dungpiles were defined as groups of single defecations attached with one another end to end or overlapped considerably, or the single defecations not more than 5 mts. away from one another at their nearest ends. Later on, this gap might have a chance to be filled up by a number of single defecations, finally making a large dung pile. The locations of single defecations and dung piles were recorded on the copies of the working maps. Repeated visits to different dunging sites, mudpools, habitat zones etc. made it possible to get acquainted with on spot identification of those places on a map. It proved to be very useful in estimating the actual home ranges<sup>1</sup> and habitat use pattern of rhinoceros in those sanctuaries. The defecations were marked and numbered with branches or twigs. Photographs of the defecation spots were taken.

### Results and Discussions

#### *Associated Pre and Post Defecating Behaviours :*

*Change of tracks :* Analysis of the tracks revealed that in most cases rhinos just stopped on their path and dropped dung. Usually the rhinos stopped near the old dung/dung piles and defecated either close to the previous one or a few metres away or over the old dung/dung pile. On five occasions at Gorumara and four occasions at Jaldapara changing of tracks for defecation was noticed mostly by the adults (Table 1). Probably they were influenced by the scent of previously deposited dung piles lying on widely separated parallel tracks.

*Earth scraping over the own dung :* Rhinos normally walked off immediately after defecation. But on eight occasions, two adults, one at Gorumara (the largest and oldest bull, GBO1) and another at Jaldapara; and in two cases one known immature male at Jaldapara left the mark of scraping the earth backwards over their own dung by both the hind feet alternately (Table 1). With the scrapings the earth covered their droppings partially. In case of the largest bull (GBO1) at Gorumara, it was observed that this earth scraping behaviour developed at the onset of dry season only after a fight with his close rival GBO2 for occupying the best area for water, cover and green grass. In that fight the former was the loser. It might be that the particular bull tried to hide the odour emitted from his freshly deposited dung as well as himself from that of his dominant rival. Although the Indian rhinos have pedal scent gland<sup>f</sup>, the dusting over their own dung might have partial success for hiding themselves. Part of their dung balls were damaged with those scrapings. Mud and leaves were cast off about one and half metre behind the dung piles.

*Dung scraping :* An opposite dung scraping behaviour was also noticed from the signs left by them. In both the sanctuaries two dominant adult bulls, GBO2 and JBO2

Table 1

Some associated pre and post defecating behaviours exhibited by rhinos in two wildlife sanctuaries

Associated behaviours	Gorumara	Jaldapara
Change of track for defecation	AO (GF02)—1 +	AO (JBO1)—1
	AO (GF03)—2 +	AO (JFO3)—1
	AO (GB02)—2	Imm. (NS)—2
Earth scraping over	AO (GB01)—4	A (NS)—4 ImmO (JJMO2)—2
Dung scraping	AO (GB02)—3	AO (JBO2)—2
	AO (GF01)—1 +	AO (JFO3)—1 +
	C (GC01)—1	Imm. (NS)—1
	Imm. (NS)—1	
Foot dragging	AO (GB01)—2	A (NS)—3
	Imm. O (GJFO2)—2 +	Imm. O (JJMO2)—1
Coprophagy	—	Probably by an immature

NS = Non sexed, Imm. = Immature, GF = Gorumara Female, GB = Gorumara Bull, GC = Gorumara Calf, GJF = Gorumara Juvenile Female, JF = Jaldapara Female, JB = Jaldapara Bull, JJM = Jaldapara Juvenile Male.

were mainly the dung scrapers. It was probably meant to exhibit themselves to their close rivals and subordinates. One mother and her calf scraped their own dung at Gorumara due to some other reason. Possibly the calf imitated the mother. Dung scraping behaviour is somewhat rare in Javan<sup>8</sup> and Sumatran<sup>4</sup> rhinoceros. It was, however, reported that though dung scraping behaviour was rare in greater one horned rhinoceros at RCNP in Nepal, all the age and sex classes were involved in scraping<sup>10</sup>. This behaviour is known to be frequent in African black<sup>9</sup> and white rhinoceros.

**Foot dragging :** The foot dragging marks made after defecation are also deserved to be mentioned here. In both the sanctuaries two adults and two immatures were involved in foot dragging behaviour after defecation. The oldest bull (GBO1) at Gorumara left the mark of foot dragging on two occasions. In both the cases small fresh dung fragments were found upto certain distance along the foot dragging marks. It might be due to the bull trying cleaning his dung laden feet, avoiding the release of odour since he became conscious of his rival GBO2 after having lost the battle. In other three cases foot dragging marks were devoid of dung fragments. It might have been that they left those signals for visual stimulation to other fellow individuals. It however, requires further investigation.

**Coprophagy :** The coprophagy nature is found to be very insignificant in case of Indian rhinoceros. During the two years of study at Gorumara no case of coprophagy was noticed. At Jaldapara, it was done probably by an immature (since the impressions of that individual were distorted owing to muddy soil and it was difficult to come to a conclusion about its exact recognition). The overall size at a glance was favourable for its inclusion in a younger age class. The coprophagy behaviour was confirmed since no other signs of post defecating unusual behaviours like dung scraping, earth scraping, foot dragging etc. was left there. The dung fragments remained scattered close by. This nature is best reported in African black rhinoceros<sup>9</sup>. The rhinoceros may be stimulated for this kind of behaviour due to shortage of minerals in their body.

#### **Scent Marking Relationship :**

Judging from the varying diameters of the dung balls of different defecations in one dung pile it was clear that the dung piles were not made by a single animal or by the animals of a particular age class, but were made by individuals of different age classes. Of the 104 dung piles at Gorumara, track and footprint analysis clearly indicated that in 40 cases two breeding pairs defecated in different parts of the sanctuary in October-November-December, where the cows were the first defecators. In 19 cases the bulls first defecated and later the cows defecated over the dung of the bulls. In 5 cases a mother-calf association was seen to defecate over their own dung (Table 2). Fig. 1 (a) and (b) show the duration and sequential formation of dung piles by individuals known

**Table 2**  
**Sequence of depositions by different individuals forming dung piles**  
 (Sample Size = 104)

SEQUENCE OF DEPOSITIONS BY INDIVIDUALS							Number of dung piles
1	2	3	4	5	6	7	
AO	←	AO					40
+		↗					
AO	←	AO					19
+		+					
AO	←	AO	←	AO	←	AO	12
+		↗		+		↗	
AO	←	AO	←	IO			11
+		↗		+			
IO	←	IO	←	IO			7
+		+		↗			
M-C	←	M-C	←	M-C			5
AO	←	IO	←	AO			3
		↗		+			
IO	←	AO	←	AO	←	AO	2 (Fig. 1 (b))
+				+		↗	
IO	←	AO	←	AO	←	IO	2
+		+		↗		+	
AO	←	AO	←	IO	←	IO	2
↗		+		+		↗	
AO	←	AO	←	AO	←	AO	1 (Fig. 1 (a))
+		↗		+		↗	
						IO	
						+	

← indicated depositions over previous one.

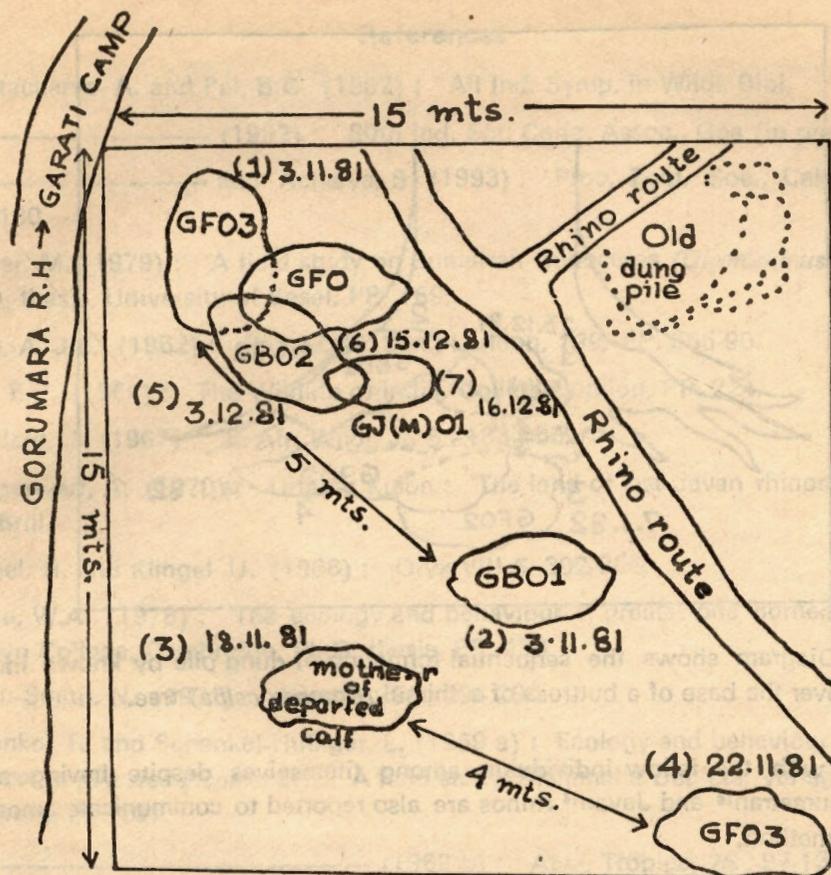
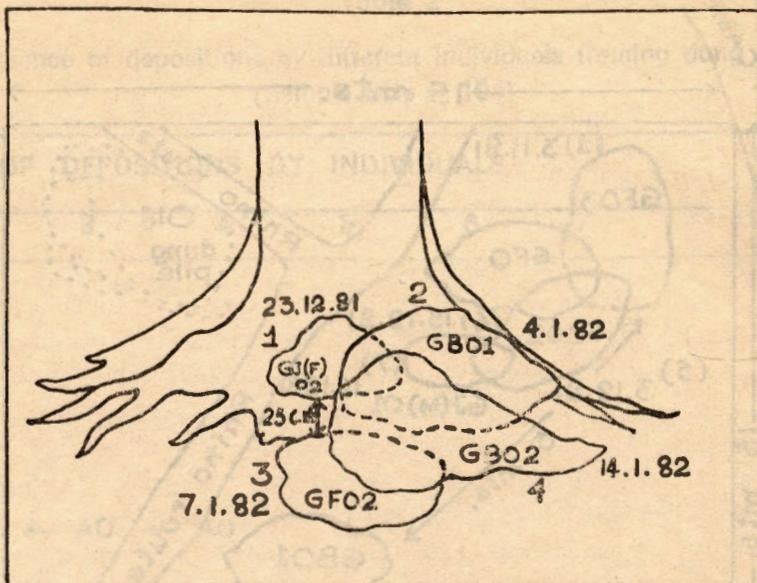


Fig. 1 : (a) A  $15 \times 15$  metre =  $225 \text{ m}^2$  area shows the sequence and duration of formation of dung piles by individuals known by footprints (not drawn to scale).

by their hind foot prints. Dung piles were used by Indian rhinos of all age and sex classes at Chitawan, Nepal<sup>10</sup> and similar findings have been reported in case of white rhinos where the dung piles appeared to have a territorial marking function<sup>11</sup>.

The rhinos followed each other by sniffing along the tracks, since pedal scent gland<sup>8</sup> occur in them. It is likely that olfactory signals include odours left on the trails from those glands in addition to those of urine and dung. The foot dragging marks are also to be mentioned here with reference to the visual stimulation. The pedal scent gland in rhinoceros may have been evolved because of the scent of dung on the feet quickly disappears in a wet environment. So, there was a selection pressure for scent marking by evolving the pedal scent gland making an alternative form. It made an easier way to locate and



(b) Diagram shows the sequential formation of dung pile by known individuals over the base of a buttress of a shimul (*Bombax ceiba*) tree.

communicate with the fellow individuals among themselves despite having a solitary nature. The Sumatran<sup>16</sup> and Javan<sup>14</sup> rhinos are also reported to communicate among themselves by this method.

### Conclusions

From the above observations it can be concluded that the dominant bulls are mainly the dung scrapers to exhibit themselves. On the other hand, the subordinates and recessives scrape the earth to cover their defecations for prevention of releasing the odour thus hiding their presence from stronger opponents. The cows are mostly the initiators for building up a fresh dung pile. A mother with calf always seeks new places for defecation and they generally avoid to take part in other individual's dung pile.

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