

## Retrieval of young by lactating Indian gerbil, *Tatera indica indica* (Hardwicke)

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MS received 23 January 1978; revised 5 June 1978

**Abstract.** Lactating gerbils, *Tatera indica indica* (Hardwicke), retrieved their young, one by one, to the nests when the litters were displaced to positions away from it. The behaviour lasted for 22 days after parturition, but latencies for retrievals did not change with the growth of pups. However, the 'grip' used in retrieving varied with their age; pups were seized by teeth on the flank, by nape of the neck and skin on their back, in the order named. Models of pups presented to mothers were, however, ignored in another experiment.

**Keywords.** Retrieving; *Tatera indica*; Latencies; Maternal behaviour.

### 1. Introduction

Retrieval or carriage of straying or fallen young to the nest by lactating mothers, forms an important component of the maternal behaviour of laboratory rat, *Rattus norvegicus* (Beach and Jaynes 1956a,b,c; Rosenblatt and Lehrman 1963; Barnett 1975). Ensuring better survival of the young, it is a stereotyped pattern under multi-sensory control (Barnett, 1975).

Females of the wild type, *R. norvegicus* Berkenhout, have also retrieving abilities (Barnett, 1975); and the behaviour has also been observed in the desert gerbil, *Meriones hurrianae* (Jerdon) (Muthana, 1975). It has, however, not been studied and timed under standard conditions.

Such abilities are consistent with the high quality of maternal care that female rodents provide to their young. The Indian gerbil, *Tatera indica indica* (Hardwicke), is no exception in this regard. Results of experiments designed to study 'retrieving of young' by their lactating females are discussed here.

### 2. Materials and methods

#### 2.1. The subjects

Subjects were wild-caught stock, maintained on rat diet (Hindustan Lever Ltd.) and *ad lib* water. Selected adults were weighed and grouped into bisexual pairs; and transferred to wire-mesh cages, 1.32 × 1.0 × 0.32 m, provided with wooden nest boxes, 20 × 10.5 × 9 cm, and newsprint strips, 30 × 30 cm, for nesting. Sand was given in

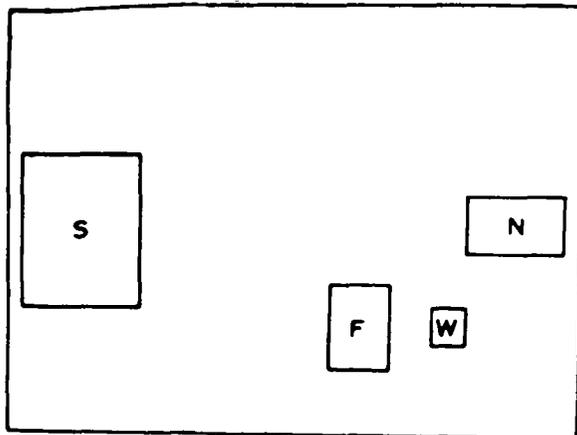


Figure 1. Arrangements inside test cages, showing the positions of nest box (N), food tray (F), water dish (W) and sand tray (S) in which the young were offered for retrieval.

separate trays for bathing. Arrangements made inside the cages are shown in figure 1.

The gerbils were left undisturbed for the next 20 days, but then the cages were examined daily. The males were removed when a litter, born obviously in the preceding night, was detected.

Of the 4 females tested in experiment I, no. 1 of 125 g body-weight had a litter of 2 young, no. 2 of 168 g of 3 young, no. 3 of 152g of 4; but no. 4 of 125 g weight had also 3 young in it's litter. Female nos 5 and 6 included in experiment II, were also suckling respectively, 2 and 3 young.

## 2.2. *Experimental procedure*

Observations began 12 to 24 hr after parturition, i.e. on the same day that a litter was detected, or later when the pups were 11 days old. Mother gerbils were removed from the cages between 1600 to 1800 hr and released back after the young had been marked, weighed and placed in the sand trays. Forceps boiled in water and dried with sterilised towels, were used for handling them.

Following re-entry of mothers into the cages, an observer (E) made the following observations.

(1) Latency, in seconds, with which the first pup of the litter was retrieved, or carried from sand tray to the nest box. It was timed from the entry of mother into the nest box to the moment, when after coming out, it seized the first pup.

(2) Latencies, in seconds, with which the other pups in the litter were retrieved, or the interval between the entry of mother into the nest box with one pup and the seizure of the next when it came out.

(3) Region of body on which the pups were seized.

(4) Time, in seconds, spent by mothers in searching the cage after retrieval of all pups in the litter.

This test was repeated in experiment I each day from birth, or after the age of 11 days, to weaning.

Responses of lactating gerbils to plastocene models of their pups placed in the sand trays, were observed in experiment II.

### 2.3. Analysis of results

Methods described by Bailey (1959) were followed for calculating means, standard deviations, standard errors of the means (SE), and for comparing retrieval latencies. Comparisons were made by paired *t* tests.

## 3. Results

The results are summarised in tables 1 to 3 and illustrated in figures 2 and 3. It would appear that observations on only two litters could be completed from birth to weaning (table 1). Female no. 3 died 13 days after parturition for unknown reasons; while retrievals by female no. 4 were timed only after the 11th day.

**Table 1.** Mean latencies, with standard errors (SE), for retrieval of pups by lactating gerbils of experiment 1. Time later spent in searching the cage are also given.

Female No.	Length of test (days since parturition)	Latencies for retrieval, seconds Mean $\pm$ S.E.				Total latencies Mean $\pm$ S.E.	Time spent in searching cage.
		1st pup	2nd pup	3rd pup	4th pup		
1	1 to 22	35.0 $\pm$ 4.55	32.59 $\pm$ 2.8	—	—	69.57 $\pm$ 6.5	29.4 $\pm$ 4.5
2	1 to 22	54.3 $\pm$ 5.78	42.7 $\pm$ 3.9	38.8 $\pm$ 3.3	—	138.5 $\pm$ 11.5	34.5 $\pm$ 4.5
3	1 to 13	52.7 $\pm$ 9.3	40.7 $\pm$ 6.2	42.2 $\pm$ 3.6	39.4 $\pm$ 4.3	183.7 $\pm$ 16.4	37.8 $\pm$ 8.7
4	12 to 17	51.6 $\pm$ 15.0	45.8 $\pm$ 7.0	41.6 $\pm$ 4.1	—	139.1 $\pm$ 23.2	46.6 $\pm$ 18.0

**Table 2.** Paired '*t*' values found by comparing the latencies with which the pups were retrieved by gerbils of experiment I

	' <i>t</i> ' of latencies timed for retrieval of		
	1st pup.	2nd pup	3rd pup
Females no. 1 & 2	3.12*	5.40*	—
Females no. 1 & 3	2.51*	3.99*	—
Females no. 1 & 4	2.65*	1.44	—
Females no. 2 & 3	3.17*	2.00	5.49*
Females no. 2 & 4	3.65*	1.95	—
Females no. 3 & 4	—	—	—

\*Significant,  $P < 0.05$

**Table 3.** Paired 't' values showing the relationship between the latencies observed for retrieval of pups of the same litter.

Female No.	't' of latencies for retrieval of					
	Pup 1 & 2	Pup 1 & 3	Pup 1 & 4	Pup 2 & 3	Pup 2 & 4	Pup 3 & 4
1	3.32*	—	—	—	—	—
2	3.96*	3.39*	—	2.73*	—	—
3	2.30*	1.69	2.20*	1.99	2.46*	2.64*
4	2.40*	1.85	—	2.60*	—	—

\*Significant,  $P < 0.05$ 

### 3.1. Growth of Gerbils from birth to weaning

The gerbil pups at birth were found blind, naked; and with limited orientation reflexes. They were, however, able to produce audible signals (or squeaking). Their body-weight varied from 4 to 5 g (mean =  $4.40 \pm \text{SE } 0.02$  g). It increased at the rate of  $1.10 \pm \text{SE } 0.32$  g/day.

Orientation reflexes were, however, rapidly acquired; crawling movements began after the 5th day, and the pups started walking after 13 days. The eyes opened at 18 days by which time most of the fur had also developed. Weaning occurred at 28 days after parturition.

### 3.2. Retrieval of young

*Experiment 1:* The young were retrieved by their mothers, from birth to the age of 22 days (figures 2 and 3). On the remaining days before weaning, they reached the nests without their help. Later they moved freely, but spent little time in the nest boxes.

The lactating gerbils showed obvious signs of distress when removed from the cage, or deprived of contact with their young less than 22 days in age. On being released back into cages, they first rushed and looked for them in the nest boxes. Coming out after variable periods, they reared and backed about the nests before moving around. Aided perhaps by squeaking of pups, they walked across to sand-trays. Retrievals began soon after as the pups were lifted one by one and carried into the nest boxes. Only once, on the 11th day after parturition, female no. 3 attempted to build a new nest where it was offered the pups, i.e., in the sand trays.

Retrieval occurred on the run and on successive runs, a straight course to the nest box was followed. The pups were not nursed or licked in the meantime. The cages were also searched for variable periods after retrieving all the pups (table 1).

### 3.3. Grips used or the method of retrieval

The gerbils used different grips in lifting the pups. After 1 to 10 days, the pups were caught on the abdomen, exactly on the flank, by the teeth; to which they also

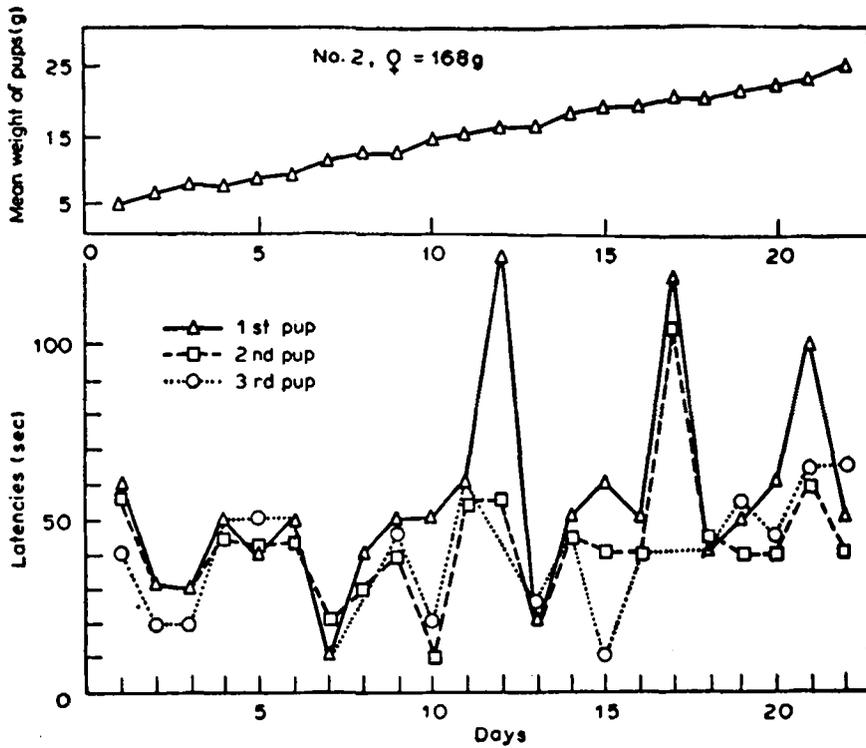


Figure 2. Latencies, in seconds, with which the pups were retrieved by female no.2.

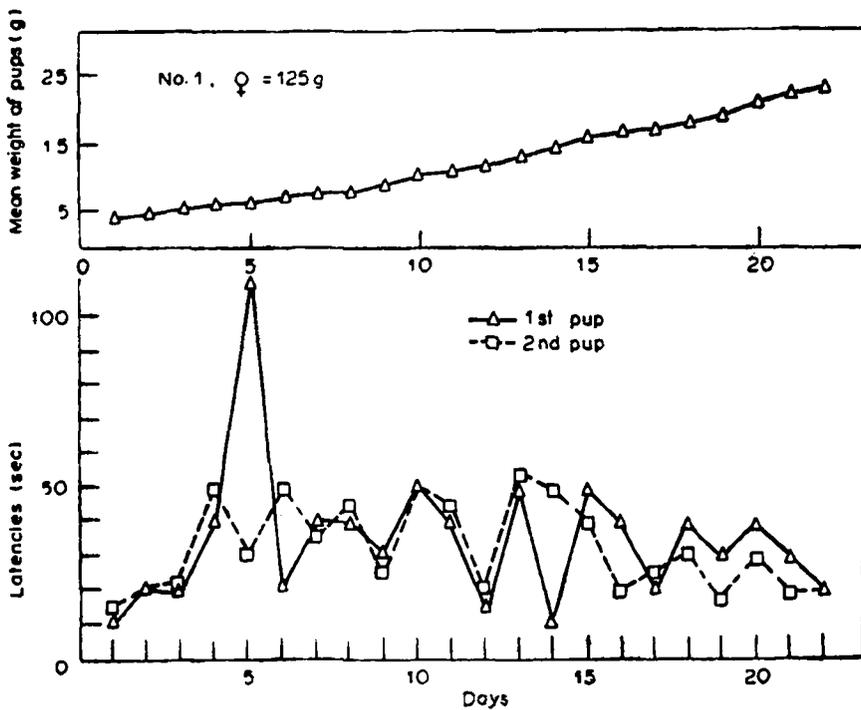


Figure 3. Latencies for retrieval of pups in another example of female no. 1.

responded by curving in their bodies. After 11 to 15 days, they were lifted by the nape of neck and after 22 days by skin on their back. The neck grip was, however, repeated by female no. 2 on 22-day old pups.

Latencies for retrieval of pups, however, did not vary with their age (correlation test,  $P > 0.1$ ). In respect of all the pups, though with different mothers, it fluctuated rather alternately, on successive days after parturition (figures 2 and 3). The range of variation was, however, wider in case of the latencies timed for the retrieval of first pup than the latencies with which the remaining pups of the litter were retrieved (table 1).

Thus, 10 to 120 sec (0.166 to 2.0 min) generally elapsed before the first pup was retrieved; 10 to 105 sec (0.166 to 1.75 min) before that of the second; 10 to 60 seconds (0.16 to 1.0 min) prior to the carriage of third pup, while an interval of only 20 to 60 sec (0.3 to 1.0 min), in the only example of female no. 3, occurred when the fourth pup was seized and carried into the nest. Differences noted in latencies were, however, found significant in most instances (table 2).

Similarly, within the litters, a linear order in retrieval latencies was discernible (figures 2 and 3). Thus, retrievals occurred, one after the other, at shorter intervals of time though again the differences seemed mostly significant (table 3).

Totals of latencies show that female no. 3 with 4 pups, spent the maximum time in retrieving, followed by female no. 2 and 4, each with 3 young, while female no. 1 with a litter of 2 pups, spent the minimum time (table 1).

### 3.5. Responses to models of pups

*Experiment II.* Lactating gerbils ignored the plastocene models of pups presented to them. However, what was made as 'eyes' in the models, was found chewed on most occasions.

## 4. Discussion

Retrieving is an experimentally induced response (Rosenblatt and Lehrman, 1963) and its relevance to wild rodents while living in their natural surroundings, is suspect (Barnett, 1975). Thus, it may only be a variation of the process of transport of pups to new nests, as occasionally observed there (King, 1963; Barnett, 1975). Of the gerbils tested in experiment I, female no. 3 also tried to build a new nest in the sand trays, before transporting the pups to the original nest several hours later.

However, there are reasons to believe that it is a separate component of maternal behaviour and that it has survival value. Retrieving abilities may thus help the lactating gerbils to (1) prevent the young from falling out of the nest when they begin crawling after 5 days, (2) stop them from straying once they start walking after 13 days and (3) bring them back to nest following a chance rescue from a predator, as was observed in an allied species by Muthana (1975).

Perhaps for these reasons, the behaviour never waned in our gerbils for 22 days following parturition; whereas in the domesticated laboratory rat, it begins to dissipate after 10 to 16 days (Rosenblatt and Lehrman, 1963). Although the litter size varied, it lasted only 2 to 5 min with latencies for retrieval of successive pups

decreasing in a linear order (table 1, figures 2 and 3). Conversely in the white rat, older pups are retrieved after long delays (Rosenblatt and Lehrman 1963).

Similarly, latencies with which the first pups were retrieved by gerbils, differed only slightly (table 1; figures 2 and 3). There was, however, little chance of their retrieving abilities having improved with practice, as observed in several investigations on the laboratory rat (Barnett, 1975). Thus, retrieval latencies showed significant differences at equivalent ages of pups (table 2) even though tests on female no. 4 began late, or 10 days after parturition (table 1).

Retrieving stopped when the young began to resist it; and tried to reach the nests on their own. The lactating laboratory rats, on the contrary, themselves grow less attentive as the pups grow older. The difference reflects the stronger development of the behaviour in a wild species, compared to its loss with domestication in the case of the latter.

The method of lifting the young or grip used, however, have not changed. Like the laboratory rats, lactating gerbils also protect the head and dorsal side of pups from rubbing the surface over which they are carried.

The results of experiment II clearly show that retrieving is not simulated by objects resembling the pups in size and shape. That such objects arouse the curiosity of gerbil mothers is however obvious from the chewing of only the 'eye' in the models. It is likely that the head is investigated more than other parts of the pup's body.

### Acknowledgements

The authors are thankful to Prof. S M Alam for facilities. One of us (VK) is also indebted to CSIR for financial assistance.

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