Development of orienting behaviour in the Indian gerbil
Tatera indica indica (Hardwicke)

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Abstract. Movements of whole body, or pivoting, dominate the early orienting
behaviour of infant gerbils, Tatera indica indica (Hardwicke). Progression is then
accomplished by creeping (4–12 days), which is superseded by walking. The early
responses are more important for survival. The young incapacitated later (age > 5
days) are thus reared successfully.

Keywords. Orienting ; pivoting ; creeping ; walking ; ontogenetic development ;
maternal processes.

1. Introduction

The infant laboratory rat, Rattus norvegicus L., possesses a repertoire of stereo-
typed behaviour patterns of considerable survival value (Barnett 1975). Of
them, orienting behaviour develops gradually in stages and has been studied by
several authors (Bolles and Woods 1964 ; Welker 1964; Blanck et al 1967).
Nothing is, however, known about the ontogenetic development of this behaviour
in wild rodents. Observations made on orienting behaviour of infant gerbils,
Tatera indica indica (Hardwicke), are discussed here.

2. Materials and methods

Female gerbils, T. i. indica, found pregnant in a wild-caught stock, were caged
individually in wire-mesh cages, 1·0 × 0·38 × 0·38 m, and given sheets of paper,
30 × 30 cm, for nesting.

Observations on movements of pups started from the day after birth (age = 1
day). The mother was trapped and removed from the cage ; pups were taken
out from the nest, one at a time, and put on a flat surface. An observer (E) recorded
the responses of each, according to method described by Blanck et al (1967).
Older pups (age > 3 days) were also tested on a slanting surface and then allowed
to move along the corners of an all-glass aquaria. Development of young in two
litters was, however, observed separately.
3. Results

Description of lactating gerbils, size of their litters and numbers finally weaned are given in Table 1. Results are described below.

3.1. Mortality of young

All pups in two litters were slaughtered and eaten by mothers on the first day of birth. However, some pups from other litters also disappeared on the following days (Table 1). They had shown slower body movements than their litter mates which survived. Presumably, they were also eaten by the mothers.

Such disappearance of pups was, however, not observed after 5 days (Table 1). Thus, the young in litters 11 and 12 which lost their limbs, following accidental falls on the floor of the wire-mesh cage, at age 5 days or above, were weaned successfully (Table 1).

3.2. Motor development

Various aspects of development of body movements were recorded as follows:

**Head**: It moved up and down without immediate return on the first day, but freely in the same axis from 2nd day. Bilateral movements started after 5 days.

**Body**: The body was curved frequently between 1st and 3rd days, but the response diminished subsequently.

**Forelegs**: It was moved on the first day, but simultaneous movements of one or both forelegs and head started after 2 days.

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**Table 1. Description of gerbils with litters, size of litters and number of young finally weaned in each.**

<table>
<thead>
<tr>
<th>Body wt of female (g)</th>
<th>Size of litter</th>
<th>No young weaned</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td>3</td>
<td>..</td>
<td>Slaughtered, eaten after birth</td>
</tr>
<tr>
<td>152</td>
<td>4</td>
<td>..</td>
<td>do.</td>
</tr>
<tr>
<td>130</td>
<td>4</td>
<td>1</td>
<td>3 young killed on 2nd day</td>
</tr>
<tr>
<td>117</td>
<td>5</td>
<td>4</td>
<td>1 young eaten on 3rd day</td>
</tr>
<tr>
<td>150</td>
<td>3</td>
<td>2</td>
<td>do.</td>
</tr>
<tr>
<td>158</td>
<td>5</td>
<td>5</td>
<td>..</td>
</tr>
<tr>
<td>151</td>
<td>3</td>
<td>3</td>
<td>..</td>
</tr>
<tr>
<td>137</td>
<td>5</td>
<td>5</td>
<td>..</td>
</tr>
<tr>
<td>162</td>
<td>5</td>
<td>5</td>
<td>..</td>
</tr>
<tr>
<td>154</td>
<td>4</td>
<td>4</td>
<td>..</td>
</tr>
<tr>
<td>180</td>
<td>3</td>
<td>3</td>
<td>Lost all limbs accidently at age 5 days</td>
</tr>
<tr>
<td>167</td>
<td>5</td>
<td>5</td>
<td>Lost all limbs accidently at age 7 days</td>
</tr>
</tbody>
</table>
Orienting behaviour in gerbils

Hindlegs: Full extension and bending of legs was observed on the first day, but movements of legs with body or head started after the second day.

Tail: It was also moved from the first day.

3.3. Pivoting

One to three day old pups showed typical movements of whole body, or pivoting. It was stretched and curved when they often turned to either side on rolling back. Several attempts resulted in shifts of body-axis of greater than 360°, even on the first day. Body positions were shifted rapidly from the second or third day.

3.4. Creeping

It started on the third day and ended after 9 to 12 days. In the early phase (3-4 days) pups turned on the belly and moved their limbs in sequence legs and forelegs to push forward. Five and six day old pups accomplished forward progression rather easily, but also reared back quickly. They moved upwards on a slanting surface (negative geotaxis), and tried to maintain contact with side-wall while moving along corners (thigmotaxis). These persisted to the end. In the last phase (7 to 12 days) the body was raised above surface while creeping. It diminished rapidly during this period.

3.5. Walking

Walking with limbs erect and in line of body, started from the age of 13 days. However, in one litter the young began walking from the age of 9 days. Pups of litter no. 11 or 12 showed no progression by creeping (or walking) since loss of limbs earlier. However, they were able to drag the body in desired direction.

4. Discussion

Orienting behaviour of laboratory rat develops in three distinct stages—a first stage lasting about 5 days is dominated by movements of head and forelegs, the second stage ending about 10 days is characterised by involvement of all legs in body movements; while in the third stage earlier responses are superseded by walking (Blanck et al 1967).

The same kind of motor development, as in rat, occurs in the gerbils, T. i. indica; but the behaviour patterns developed show some differences. Thus, the important stages distinguished are (i) pivoting: from the first day of birth which includes movements of whole body, (ii) creeping: that starts from the age of 3 days and involves the use of all legs in orienting body, and (iii) walking: which may start as early as 9 days and supersedes earlier method of progression by creeping.

Apparently, the observed behaviour patterns have different functions. Raising of head and movement of forelegs enable the pups to suckle as the mother crouches above (Barnett 1975). Pivoting may help then in changing places or
adjusting body positions in the nest. The early responses are, however, also responsible for releasing maternal processes— as treading or let down of milk, licking, retrieving, etc. (Barnett 1975). However, creeping and walking serve to bring in the nest or the immediate environment within the range of developing animals (Blanck et al 1967).

The taxes indicate the development of special sensory functions (Barnett 1975). Of them, at least two develop in the gerbils at an early age. However, their adaptive value, or utility in the natural environment, is not known.

Evidently orienting behaviour is more important in the first few days of life. Thus, the pups which are slow at body movements, or pivoting, are slaughtered, but those incapacitated later are weaned successfully. Failure to creep or walk proves of no consequence.

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