

REPRODUCTIVE PATTERNS OF CAPTIVE LESSER BANDICOOT RAT (*BANDICOTA BENGALENSIS* GRAY) IN THE PUNJAB¹

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Abstract. Development of the lesser bandicoot rats was studied under caged conditions. Early development of both sexes was similar. Walking started (14 days) at about the time sensory organs became functional. Body weight in males continued to increase for about 9 months. After about 5 months, weights of females fluctuated with pregnancies. Sexual maturity was attained by 60 days in females, slightly earlier in males (51 days). A female might produce 9 litters annually; mean litter size was 5.4. Sex ratio was 41% males.

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The lesser bandicoot rat (*Bandicota bengalensis* (Gray)) is of great economic importance. Though most rats are nocturnal, this species may be active at all hours. During the day its long, deep burrows are extended (Kamath 1961, Deoras 1967, Sagar and Bindra 1971). These burrows in banks and under rail tracks may result in indirect damage: loss of irrigation water, flooding, or derailment of trains. At night, the activity is confined to collecting and storing food-stuffs. A single burrow has been found to contain 7.3 kg of wheat heads (Sagar and Bindra 1971), and the literature contains many other reports regarding their hoarding behaviour. Males and females usually live in separate burrows.

To control this rat, detailed knowledge of its biology is essential. However, no studies have been done in the Punjab and few in the adjoining states. To fill this lacuna, the post-natal development and reproductive patterns were studied, and results are presented in this paper.

MATERIALS AND METHODS

The rats, collected between March and May by trapping with Wonder traps (multiple-catch live traps manufactured in Bombay) and by digging out burrows, were examined for ectoparasites before bringing them to the laboratory. Infested rats were dusted with 10% BHC dust.

Cages. Outdoor, galvanized-metal, rat-breeding cages (2.5 x 0.8 x 0.8 m) divided into 3

compartments were maintained in dense shade trees adjacent to the laboratory. Wire-netting provided ventilation, and each compartment had a 30 x 30 cm glass pane for observing the rats. Food trays were hung from the back wall of the cage, and a watering trough was secured about 40 cm away from the tray.

A small wooden box (30 x 20 x 20 cm) with a sliding door on one side and a 6 cm entry hole on the other was provided in each compartment of the cage. Packing straw was placed near each box, and each female made a nest in the box. The wooden boxes were taken out and cleaned every fortnight, and fresh straw was provided.

Food (mixture of Bengal gram flour, maize flour, and wheat flour in dough form, enriched with 2% each of multivitamins and bone calcium; or grains of husked rice, pearl-millet, and wheat) was renewed every morning; water, twice a day. Supplies were always in excess of requirements. The fecal pellets and hair were removed daily, and the cages and feeding trays were washed weekly.

Reproductive biology. Field-collected rats were kept isolated for 4-5 weeks in 45 x 30 x 22.5 cm wire-mesh cages until they were paired on 20 June 1970 in the outdoor cage compartments. The rats were observed twice daily. When young were born, they were counted, sexed, and marked by toe clipping. The next day, and at weekly intervals, the young were weighed and the body, tail and hind foot lengths were recorded. Post-natal development was observed daily, special attention being paid to sexual development.

Pairing of first generation. Young were weaned at the age of 3 weeks. Those from the same litter were kept together until 11 February 1971 when they were divided into groups of 1 female, 1 male; 2 females, 1 male; 3 females, 1 male and moved into separate compartments of the outdoor cage.

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RESULTS AND DISCUSSION

Post-natal development. The newly-born young were pink, with ears and eyes closed, devoid of hair but with 1.5–2 mm long vibrissae. Opening of ear flaps took 3–5 days. The skin started turning grey on the 4th day and was completely grey on the 7th day; the body was completely covered with fine hair by the 12th day. The incisors were first seen on the 7th day and attained a length of 0.6 cm in the lower jaw and 1 cm in the upper jaw at the age of 14 days. The teats, which could clearly be seen by the 7th day, varied from 13 to 16 in number (mean = 14.3 ± 0.9). The young started walking when 14 days old. The eyes opened after 13 to 16 days; the external auditory meatus, after 17–20 days. These findings are similar to those of Spillett (1968) in Calcutta.

Growth rates. Prior to weaning at 3 weeks, body extension was the most rapid; after weaning increases in body weight were greater. After about 6 weeks, growth rates markedly declined. Early development in males and females was similar. While body weight in males continued to increase for about nine months, other growth parameters had leveled off between 120 and 180 days. After about 5 months females started producing pups, and fluctuations occurred in their body weights due to pregnancies and deliveries. In the initial 5 months, growth in males and females was similar. These observations are similar to those of Spillett (1968), although he indicated a continuing increase in weight during a 13-month study period.

BREEDING HABITS

Age at puberty. The testes descended into the scrotal sac at 34–81 days mean (51.2 ± 11.4 days). The vaginal perforation occurred 41–102 days (mean 60.3 ± 13.8 days) after birth. Thus puberty was attained in about 51 days in males and 60 days in females. Spillett's (1968) few observations are within these ranges. Autumn-born young took longer than those in spring litters.

The first litter was produced at an age of 93, 163, 168, 201, 203, and 223 days in 7 different females. Bindra and Sagar (1968) reported that *Rattus meltada* fe-

males produced their first litter at the age of 108 to 335 days and that young born during one breeding season usually produced their first litter during the following breeding season. In the present studies, young born during August–December reproduced the following March–July, except for one female born in August that littered the following November.

Breeding seasons. Of the field-collected adult rats used to make 3 pairs on 20 June 1970 in outdoor, rat-breeding cages, 2 females died without reproducing. The third female produced 7 litters from August 9, 1970 to April 7, 1971: on 8/9/70 (1 young), 8/30/70 (5 young), 10/4/70 (8 young), 11/8/70 (5 young), 12/10/70 (9 young), 3/15/71 (4 young), 4/7/71 (10 young).

In the next breeding season, the original field-collected rats and their young (born during August–December) produced young from March 7, 1971 to August 26, 1971. Thus, births occurred throughout the year except during January, February, and September; March and August were months of peak breeding. Spillett (1968) found that in Calcutta this species bred throughout the year. Srivastava *et al* (1971), on the other hand, reported that it bred only during 2 seasons: March to May and October to December.

Gestation period. Mating was not observed. The minimum period between 2 consecutive parturitions among the 16 cases studied was 21 days. The gestation period, was therefore, considered 21 days. Spillett (1968) reported that in Kolar (Mysore State) the gestation period in this species was 23 days. For *R. meltada*, Bindra and Sagar (1968) reported gestation periods of 20 days or less in the Punjab. According to Clegg and Clegg (1963) it is 21 days in *Rattus norvegicus*. The figures of 47 days for *Rattus rattus* and 39.5 days for *T. indica* reported by Deoras (1967) may be explained by lactation effects and delayed implantation.

Numbers of litters per year and litter size. Litters usually were produced at night. An individual female produced 1–5 litters during August–December and 2–4 litters during March–July. Thus, in one year

in the Punjab as many as 9 litters may be produced. In *R. mullata* the maximum number of litters produced in a year in the Punjab was 7 (Bindra and Sagar 1968). Burton (1962) and others reported that *R. rattus* and *R. norvegicus* females produced 5-6 litters in a year. Thus, it can be concluded that littering in *B. bengalensis* is more than in many other species of rats.

In 29 litters obtained in the laboratory, size varied from 1 to 10, the mean being 5.4 ± 2.6 . Sagar and Bindra (1971) found up to 15 newlyborn young with a single female of this species in burrows. Others have cited mean litter sizes of 6.2 or more (Spillett 1968). The maximum litter size in *R. mullata* was 8 in the laboratory (Bindra and Sagar 1968); in *R. rattus*, litter size varied from 4 to 6 (Deoras 1967). Thus, the litter size in *B. bengalensis* may be similar to that of the other common species of rats in India.

Sex-ratio. An examination of 155 young showed that 41% were males and 59% females. Thus, the male:female ratio of 2:3 was similar to the 44% and 38% in Maharashtra, but different from that reported in Madras (55.7% males) or in 3 Bombay godowns (61% males) (See Spillett 1968).

Longevity. One field-collected adult female survived for 1.75 years in the laboratory. The laboratory-born individuals survived for a maximum of about

1.5 years. This is much longer than the life span (170 days) reported by Spillett (1968) for this species under natural conditions.

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