POST-PARTURITIONAL CONCEPTION IN CAPTIVE MUSK SHREWS, SUNCUS MURINUS

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Copulation occurring immediately after parturition was observed in captive musk shrews, Suncus murinus, and lactation was noted in wild shrews during pre-implantation (Dryden, 1969). Parturition intervals and the timing of second litters after the death of the previous litter in permanently paired shrews, however, indicated that mating did not invariably occur immediately after parturition. This interpretation was supported by a few instances in which copulation and conception occurred several days after loss of the nestling young but these data were insufficient to establish whether receptivity after parturition and ability to conceive were continuous in this species.

Incidental to collecting nestling musk shrews and re-mating their mothers, data were obtained which pertain to this question. One hundred litters of nestlings were removed at various times after birth from females which had been isolated since mating. These females were then re-exposed to a series of two to four stud males overnight and isolated again the next morning. Nest boxes were inspected daily and appearance of the next litter was taken as evidence of re-breeding success. Females which ate their newborn or in which resorption of the young occurred in utero were counted as re-breeding failures. The data were collected from October 1969 to May 1970 from a closed colony derived from stock previously described (Dryden, 1969) which was maintained under conditions of 14 hr of artificial light per day at 20 to 28°C.

Females were re-exposed to stud males throughout the normal lactation period of approximately 3 weeks (Dryden, 1968) after suckling their young for periods varying from 0 to 16 days. The results are summarized in Table 1 and show that at least 67% of the animals in each group tested delivered young which had been conceived after nursing was interrupted, often in advanced lactation. The overall parturition success was 79% and the mean litter size was 2-10, a somewhat higher figure than that (1-84) obtained during the first few months after adoption of this species to captivity (Dryden, 1968). Six of the seventy-nine litters, comprising nine (5-4%) of the total of 166 young, died. The remainder were reared normally. Adequate records of nestling mortality are not available for the colony as a whole but the loss of young by these females does not seem unusually high.

Since copulations were not observed, the parturition success of 79% must be regarded as a conservative estimate of the ability of these shrews to conceive on
exposure to a male following the loss of their nestlings. Some of the young may have been resorbed or eaten and some stud males may not have been aggressive enough to cover the female, an important factor in the successful reproductive behaviour of this species (Dryden, 1969).

The problem of estimating the age of corpora lutea of the previous pregnancy in wild shrews by using the stage of embryo development during the current pregnancy as a timing criterion was also referred to by Dryden (1969). Difficulty in fitting a smooth regression curve to the sizes of the corpora lutea of lactation was experienced and several explanations for this difficulty were advanced. While inconclusive in themselves, the present data suggest that if wild musk shrews also conceive several days after parturition, the stage of embryo development is an unreliable criterion for ageing their corpora lutea of lactation, and the maintenance of large corpora lutea of lactation relative to the size of those of non-lactation is supported.

<table>
<thead>
<tr>
<th>Table 1</th>
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parturition success of 100 shrews re-mated at various intervals after parturition

<table>
<thead>
<tr>
<th>Interval between parturition and mating (days)</th>
<th>Breeding success in relation to days of permitted lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>6 to 10</td>
</tr>
<tr>
<td>1 to 5</td>
<td>18/22</td>
</tr>
<tr>
<td>6 to 10</td>
<td>14/21</td>
</tr>
<tr>
<td>11 to 15</td>
<td>2/3</td>
</tr>
<tr>
<td>16 to 21</td>
<td>2/3</td>
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</table>

If it is also assumed that *Sorex araneus*, during its breeding season, behaves similarly to *Suncus*, the early deductions of Brambell (1935) on the nature of sexual receptivity in wild *Sorex* can be reviewed in a different perspective. Brambell assumed that, if *Sorex* failed to conceive within about 1 day of parturition, it would usually become non-receptive during lactation. He found, however, eight parous, pregnant, but non-lactating shrews (out of 291 adult females) and considered two explanations for the condition of these shrews: that they conceived after lactation had ceased or that they conceived after parturition but lost their nestlings and stopped lactating. The present data on *Suncus* suggest a third possibility: that they lost their nestlings, re-mated and stopped lactating (or stopped lactating prematurely and then re-mated). Brambell found one *Sorex* with oviducal (but not uterine or vaginal) spermatozoa at the 'height of lactation'. He considered two possible explanations: (1) that this shrew mated just after parturition but failed to ovulate, retaining spermatozoa only in the oviducts, and (2) that copulation occurred during lactation, which was thought to be a more probable event early in the breeding season. The data on *Suncus* in the present study support the latter explanation.

It should be remembered that these data were derived from captive shrews, presumed to be healthy, and that their young were removed from their nests. Under more natural circumstances, loss of the young might result from deteriora-
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tion of the mother’s condition during lactation, and that, if she failed to con-
ceive soon after parturition, she might not be capable of doing so during the
normal period of lactation. Because no matings were attempted 16 to 21 days
after parturition in shrews which had lactated for 6 to 10 days, continuous
ability to conceive after interrupted lactation is not proven but is strongly
suggested by these data.

REFERENCES

BRAMBELL, F. W. R. (1935) Reproduction in the common shrew (Sorex araneus Linnaeus). I. The
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