OBSERVATIONS ON THE ABILITY OF THE STUD MALE TO BLOCK PREGNANCY IN THE MOUSE

SUZANNE BLOCH
Department of Obstetrics and Gynaecology, University of Basle,
Schanzenstrasse 46, CH-4000 Basle, Switzerland

(Received 9th November 1973)

The block to pregnancy in newly mated female mice caused by the proximity of a strange male ('Bruce effect') occurs in a greater number of females when the male belongs to a different strain from the female (alien male) than when he belongs to the same strain (strange male) (Bruce, 1960; Parkes & Bruce, 1961). The difference between strains implies that the uniformity of odour or 'spectrum of odours' of a strain is more powerful than individual differences between males. The proportion of blocked pregnancies was not influenced between males of the same strain when the 'strange males' were litter-mates of the female and/or of the stud male (Bloch & Wyss, 1972).

Some observations, however, suggest a certain ability of the female to discriminate between individual males. According to Bruce (1960, 1968, 1969), the recently mated female can be removed from her stud partner within a few hours of coitus and returned 24 hr later without disturbance to the pregnancy. This presupposes at least partial recognition of the stud male as an individual. The reaction is governed by the ability of the female to discriminate between the stud male 'made familiar by coitus' and the unfamiliar male to which she is exposed (Bruce, 1969).

We assumed that the female recognizes the stud male after being separated from him for 24 hr, not because he was the coital partner, but because usually he had been with the female for a certain time before mating so that she had become accustomed to his odour. Experiments were therefore designed to ascertain the difference between stud males which had mated with females after being in the same cage for only 24 hr and males which had been with the females for at least 3 weeks but had not achieved coitus.

All male and female mice belonged to the same random-bred strain (NMRI). Three groups of experiments were performed.

(a) In sixty experiments, a male and a female were kept together in a cage and allowed to mate. At the end of the ensuing gestation, the male was replaced by another male which mated at the post-partum oestrus. After detection of the vaginal plug, the male and newborn young were removed and the female was left alone for 24 hr. The male which had been with the female during pregnancy was then placed with her again as 'strange male' for 3 days.

(b) In another series of sixty experiments, a male was placed with a pregnant female just before parturition and was allowed to inseminate her at the post-partum oestrus. The young and the male were then taken away and after
24 hr, the stud male was returned to the female as a ‘strange male’ for 3 days. 
(c) Sixty control females were left without ‘strange males’ after mating.

In all three groups, the females were put together with several other females of the same group after 3 days and were left without males. The results are shown in Table 1.

(a) The male which had been with the female for 3 weeks but was not the coital partner blocked the pregnancy in twenty out of sixty cases (33%).
(b) The stud male which performed the mating, but had been with the female for 24 hr only, blocked the pregnancy in thirty-one out of sixty cases (51%).
(c) Sixteen out of sixty inseminated control females left without ‘strange males’ (27%) did not become pregnant.

Blocked pregnancies were diagnosed by the absence of pregnancy. In twenty-five females out of sixty in each of Groups (a) and (b), however, daily vaginal smears were examined for 10 days following the detection of the vaginal plug. Of these fifty females, twenty-two were not pregnant. Fourteen of them returned to oestrus within 7 days, one on Day 8 and two on Day 9, and five did not show an oestrous smear within 10 days.

Bruce (1960, 1961, 1968) considers a dioestrous period exceeding 7 days, the “arbitrary limit . . . accepted for a blocked pregnancy” (Bruce & Parkes, 1961), as pseudopregnancy. We have, however, observed dioestrous periods of up to 10 days in grouped females which had never been with males. We prefer, therefore, to diagnose the blocked pregnancies by the absence of gestation.

**Table 1.** Proportion of pregnancies which failed in two experimental groups and one control group of NMRI-strain mice

<table>
<thead>
<tr>
<th>Group</th>
<th>Stud male</th>
<th>Test male</th>
<th>No. of mated females</th>
<th>Pregnancies which failed No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Unfamiliar</td>
<td>Familiar</td>
<td>60</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>(b)</td>
<td>Unfamiliar</td>
<td>Unfamiliar</td>
<td>60</td>
<td>31</td>
<td>51</td>
</tr>
<tr>
<td>(c)</td>
<td>Familiar</td>
<td>None</td>
<td>60</td>
<td>16</td>
<td>27</td>
</tr>
</tbody>
</table>

Group (a) versus Group (b) *P*<0.05; Group (a) versus Group (c) not significant; Group (b) versus Group (c) *P*<0.01.

The pregnancy-failure rate of 27% in the control group seems high. In previous experiments, we had controls with equal as well as with higher proportions of pregnancies. We have no explanation for these differences. The controls were always observed simultaneously with the experimental groups.

We assume that the female fails to have her pregnancy blocked not because of recognition of the male that performed coitus but because she became accustomed to his odour by being with him for a longer period of time.
REFERENCES


