Do male house mice (Mus musculus) discriminate between females that differ in nutritional status?

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ABSTRACT

Most studies of mate choice have focused on female preference for male traits because it is generally assumed that since males provide less parental investment they are not choosy. However, if males suffer missed opportunity costs by mating with lower quality females, selection should favor males with the ability to discriminate among females. We tested the hypothesis that male house mice (Mus musculus) discriminate between females that differ in nutritional status (non-food-deprived versus food-deprived). We recorded the time males spent investigating either type of female and used that to determine preference (spending ≥55% of their total investigation time with one female). We also examined the effects of female nutritional status and female preference status (preferred versus non-preferred) on the reproductive success of males. Males did not display a preference for non-food-deprived females nor did their reproductive success vary with nutritional status or preference status of females. Interestingly, males spent more time investigating females that were closest to the male's own weight. In addition, pairs that were closer in weight were more likely to produce a litter. These results suggest that male house mice are capable of discriminating among females and that such discrimination may influence their reproductive success.

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In promiscuous species, in which males contribute very little PI (e.g., Mus musculus), it is generally assumed that males do not discriminate among females (Parker and Simmons, 1996; Cunningham and Birkhead, 1998). However, if there is variation among females based on their quality (e.g., nutritional status) there may be the possibility for males to suffer a missed opportunity cost (i.e., missing the opportunity to mate with a potentially higher quality female). If males mate with lower quality females then they may miss the opportunity to mate with higher quality females due to costs associated with producing ejaculate (Dewsbury, 1982) and because females are also promiscuous (Potts et al., 1991; Dean et al., 2006; Firman and Simmons, 2008). Potts et al. (1991) found that in seminatural enclosures 52% of litters resulted from females mating with males outside of their social mate’s territory and Dean et al. (2006) reported that 20% of wild-caught litters showed evidence of multiple paternity. These results indicate that females are also promiscuous and suggest that males that choose to mate with one female may lose the opportunity to mate with another potentially higher quality female. Therefore, selection should favor males with the ability to discriminate among females based on their attractiveness as potential mates (Altman, 1997). A few studies have shown that male rodents can discriminate among females based on estrous state (e.g., Taylor and Dewsbury, 1990), mating history (e.g., Ferguson et al., 1986), quality of diet (e.g., Ferkin et al., 1997), nutritional status (e.g., Pierce et al., 2005), infection status (e.g., Kavaliers and Colwell, 1993, 1995; Goubral and Gabrion, 2004), MHC alleles

1. Introduction

In most mammal species, males and females typically provide different amounts of parental investment (PI) and this difference has been hypothesized to play a primary role in the evolution of different mating strategies between the sexes (Bateman, 1948; Trivers, 1972). In general, there is competition among individuals of the sex that provides less PI for access to the sex that provides more PI (Trivers, 1972). Males usually provide less PI and have evolved characteristics that increase their likelihood of gaining access to females (Cunningham and Birkhead, 1998; Qvarnström and Forsgren, 1998), while females usually provide more PI and have evolved characteristics that may enable them to assess the quality of potential mates (Bateman, 1948; Andersson, 1994). Since the lifetime reproductive success of females depends, in large part, on the quality of their mates, the majority of studies have focused on female mate choice (e.g., Lenington, 1983; Shapiro et al., 1986; Cooper-Smith and Lenington, 1992; Eklund, 1998; Drickamer et al., 2000; Ehman and Scott, 2002; Kavaliers et al., 2003; Spritzer et al., 2005).

In promiscuous species, in which males contribute very little PI (e.g., Mus musculus), it is generally assumed that males do not discriminate among females (Parker and Simmons, 1996; Cunningham and Birkhead, 1998). However, if there is variation among females based on their quality (e.g., nutritional status) there may be the possibility for males to suffer a missed opportunity cost (i.e., missing the opportunity to mate with a potentially higher quality female). If males mate with lower quality females then they may miss the opportunity to mate with higher quality females due to costs associated with producing ejaculate (Dewsbury, 1982) and because females are also promiscuous (Potts et al., 1991; Dean et al., 2006; Firman and Simmons, 2008). Potts et al. (1991) found that in seminatural enclosures 52% of litters resulted from females mating with males outside of their social mate’s territory and Dean et al. (2006) reported that 20% of wild-caught litters showed evidence of multiple paternity. These results indicate that females are also promiscuous and suggest that males that choose to mate with one female may lose the opportunity to mate with another potentially higher quality female. Therefore, selection should favor males with the ability to discriminate among females based on their attractiveness as potential mates (Altman, 1997). A few studies have shown that male rodents can discriminate among females based on estrous state (e.g., Taylor and Dewsbury, 1990), mating history (e.g., Ferguson et al., 1986), quality of diet (e.g., Ferkin et al., 1997), nutritional status (e.g., Pierce et al., 2005), infection status (e.g., Kavaliers and Colwell, 1993, 1995; Goubral and Gabrion, 2004), MHC alleles

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females that were fed and males spent more time investigating the anogenital odors of attractivity, proceptivity and receptivity of female meadow voles et al. (2005)

Food-deprived female rodents have been found to have lower gonadal steroid and estradiol concentrations (e.g., Kauffman and Rissman, 1999). A few studies have reported that diet quality influences preference for odors of potential mates (e.g., Walkden-Brown et al., 1994).

2.1. Subjects

During fall, 2005, a colony of house mice was established by systematically out-breeding mice captured from three sites in Butler County, Ohio (n = 63). Breeding pairs were established by pairing one male and one female in a cage (15 cm × 29 cm × 17 cm) for 10–14 days. The coefficient of relatedness among all breeding pairs was <0.125. In January 2007 additional wild-caught mice (n = 20) from two sites in Butler County, Ohio, were added to the colony. All mice were housed in standard polycarbonate cages with stainless steel lids. Each cage contained Cell-sorb Plus bedding (Fangman Specialties Inc., Cincinnati, Ohio) and one cotton square (Nestlet; Ancare Corp., Waupaca, Wisconsin). The colony rooms were maintained at 18–23 °C and 20–70% relative humidity with a 14:10 light:dark cycle (lights on at 08:00). Unless otherwise noted, water and food (LabDiet® no. 5010; PMI Nutrition, LLC, Brentwood, Missouri) were provided ad libitum.

We conducted 73 male preference trials from May to June 2007 by randomly selecting 73 males and 108 females from the colony. All mice were weaned at 24 days. Males were housed individually and the majority of females were housed in sister pairs (86.5%). The remaining 13.5% (n = 13) were housed individually and were balanced between the two treatment groups: non-food-deprived (n = 6) and food-deprived (n = 7). At the time of the trials, all males and females were sexually naive and were 77–122 days old (females: \( \bar{x} \pm SE = 94 \pm 1.3 \) d; males: \( 94 \pm 1.8 \) d). The average difference in the age of females used during the same preference trial was 4.1 days.

2.2. Male preference

The preference apparatus (61 cm × 30 cm × 44 cm) was constructed using Lexan® that was completely surrounded by opaque material. In addition, all trials were conducted under red light during which an infrared camcorder recorded a top-down view. The apparatus consisted of two outer compartments (A and B; 23 cm × 20 cm), each containing a female held in a wire mesh cage (Fig. 1). Compartments A and B were separated by a 15 cm × 20 cm × 44 cm opaque Lexan® box, which the focal male could not enter. The remaining area of the apparatus (61 cm × 10 cm) allowed males access to both females (Fig. 1).
Females used in any given preference trial had a coefficient of relatedness <0.125. Food was removed from FD females for 18 h (14:00–08:00) every other day for 1 week (i.e., 4 days of food deprivation). During that same time period, males and non-food-deprived females were fed ad libitum. A similar food deprivation protocol caused food-deprived females to produce fewer male offspring (Meikle and Drickamer, 1986; Meikle and Thornton, 1995). Additionally, daughters of food-deprived mothers reached puberty significantly later (Drickamer and Meikle, 1988) and sons were less attractive to mates (Meikle et al., 1995). Hence we assumed that such alternating food availability has a negative impact on the physiological state of FD females.

Preference trials were begun immediately following the final 18 h of food deprivation. Prior to each trial, all mice were weighed and the estrous state (proestrus, metestrus, estrus, or diestrus) of females was assessed using vaginal smears (Cooper et al., 1993). The weights of NFD females and FD females were recorded in order to verify the effect of food deprivation. After each trial all individuals were fed ad libitum. Principles of laboratory animal care (NIH publication No. 86-23, revised 1985) were followed and all procedures were approved by the Institutional Animal Care and Use Committee of Miami University (Protocol No. 727).

Since pairs of females (non-food-deprived and food-deprived) were randomly determined prior to conducting food-deprivation (i.e., 1 week prior to conducting a preference trial), it was not likely that both females of a pair would be in estrus at the start of the preference trial. Therefore, in order to account for differences in the stage of the estrous cycle we performed vaginal smears on the day of the trial. We then used post hoc analyses to determine whether or not any differences in stage of the estrous cycle significantly influenced male preference.

Since males were able to move freely between females, they were able to investigate both a NFD female and a FD female during a 15-min trial. Immediately prior to each trial, the male was barricaded within several inches of each caged female for 2 min in order to ensure that he was aware of both females. We systematically alternated the side of the apparatus on which the FD female was held (A or B; Fig. 1), which side males were introduced first, and which female (FD or NFD) the male was introduced to first. After exposing males to both females, males were isolated in a removable central chamber (15 cm × 10 cm × 30 cm; Fig. 1) for 1 min. The central chamber was removed and the amount of time males spent investigating (i.e., time spent across the investigation line on either side A or B; Fig. 1) each female during a 15-min trial was recorded and used to determine if the males displayed a preference. The apparatus and wire mesh cages were thoroughly cleaned with soap and hot water between every trial.

Similar to Gowaty et al. (2003), we defined preference as males’ (1) spending at least half of the trial time (15 min) investigating one or both females and (2) spending at least 55% of their total investigation time (time spent on side A and B) investigating one of the two females. If preference was not established by a male during the first trial for a pair of females (n = 20) another trial was conducted using the same two females but a different male. However, if preference was still not established (n = 5), those females were no longer used in the experiment. Only the data for those trials in which our criteria were met (i.e., preference was established) were analyzed (66% of preference trials).

The preference criteria we used were conservative because it is more difficult to find a statistically significant difference in preference for one treatment over another (FD or NFD) when the percentage is closer to 50% than it is if we had used a higher cutoff for preference (e.g., at least 70% of the investigation time spent with one female). Hereafter the use of “preference” will indicate that males spent at least 55% of the total investigation time with one female (preferred female) regardless of whether the female was food-deprived or not. In addition, we analyzed male investigation time (a continuous variable) independent of the above definition of preference.

2.3. Breeding procedure

If a male met the above preference criteria, he was housed for 10 days with either his preferred (P) or non-preferred (NP) female, which had been either food-deprived (FD) or non-food-deprived (NFD), for 10 days. In other words, each female was either P or NP and either FD or NFD, and each male was systematically placed with only one of the four types (P/NFD, P/FD, NFD/ NP, or NP/ FD) of females to balance the number of potential breeding pairs per treatment. After 10 days males and females were separated and housed individually. Females were monitored daily to determine the date of birth, the number of pups born, and the total weight of pups of each sex. At 24 days of age, we weaned, sexed, counted, and weighed all pups.

2.4. Statistical analyses

We used a chi-squared goodness of fit test (Zar, 1999) to determine if there was a difference in the number of males that preferred NFD or FD females. Because we had clear predictions about the preference of males based on the nutritional status of females and the influence of food deprivation on the weight of females, one-tailed t-tests were used to compare the average percentage of the total trial time males spent investigating NFD versus FD females and to determine if there was a significant difference between the average weight of FD and NFD females. Pearson correlations (SAS 9.1) were conducted to compare the proportion of the trial time males spent investigating females with respect to the weight difference between their P and NP females and to compare the difference in proportion of time males spent investigating P and NP females with respect to the difference between the weight of the male and his preferred female.

In order to investigate the effect of female nutritional status or female preference status on male RS, we used contingency chi-square tests and a 2-way analysis of variance (ANOVA, SAS 9.1). We used contingency chi-square tests to analyze the number of times a litter was produced or not with regard to the nutritional status of females, female preference status, the weight of females and the relationship between the weight of males and their mate. The factors in the model used to conduct an ANOVA were nutritional status and preference status. At birth, the average number of pups per litter and the average weight of pups per litter were calculated based on nutritional status and preference status and were analyzed using

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**Fig. 1.** Apparatus used to give a male a choice between a non-food-deprived female and a food-deprived female held in wire mesh cages (on sides A and B).

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a 2-way ANOVA. At weaning, the average number of pups per litter, the average weight of pups per litter and the average weight of sons and daughters per litter were calculated based on nutritional status and preference status and were also analyzed using a 2-way ANOVA.

3. Results

3.1. Preference

Forty-eight of the 73 male preference trials met the preference criteria (spent at least half of the trial time (15 min) investigating one or both females and at least 55% of the trial time with one of the two females). Of the 48 trials that met the preference criteria, there was no significant difference between the number of males that preferred NFD (non-food-deprived) females ($n = 28$) and the number that preferred FD (food-deprived) females ($n = 20$; $\chi^2 = 1.33$, $P > 0.10$). Males also did not spend more time investigating NFD females than they spent investigating FD females ($t = -1.25$, df = 94, $P > 0.10$) even though NFD females ($\bar{x} \pm SE = 16.1 \pm 0.32$ g) were significantly heavier than FD females ($14.4 \pm 0.30$ g; $t = 3.99$, df = 94, $P < 0.000$). In addition, while FD females lost 6.8% of their body mass over the 1-week food-deprivation period, NFD females gained 1% of their body mass over that same time period ($t = -5.7$, df = 70, $P < 0.000$; Table 1). There was no significant difference between the initial weight of NFD and FD females ($t = 0.37$, df = 69, $P = 0.71$), the average percent of weight loss between the lighter half (prior to food deprivation) and the heavier half of FD females ($t = 0.39$, df = 35, $P = 0.70$), or the weight of P and NP females ($t = -0.39$, df = 92, $P = 0.70$).

Since males spent a greater proportion of the 15 min trial investigating their P females as the weight of the P females minus the weight of NP females increased ($R^2 = 0.09$, $P = 0.037$), one might assume that males would prefer the heavier of the two females. However, this was not the case. In fact, males did not prefer heavier females more often than they preferred lighter females ($\chi^2 = 0.33$, $P > 0.5$) nor did males spend more time investigating the heavier of the two females ($t = -0.95$, df = 92, $P = 0.17$). Furthermore, when males and their P female were closer in weight, males spent more time investigating their P female ($R^2 = 0.15$, $P = 0.006$; Fig. 2). In addition, the heavier half of males showed a non-significant tendency to prefer NFD females (17 of 24), while the lighter half of males showed a non-significant tendency to prefer FD females (13 of 24; contingency $\chi^2 = 3.08$, $P = 0.08$). Taken together, these results suggest males may find females that are closest to their own weight more attractive.

There was no significant difference in the number of females in estrus or proestrus between NFD ($n = 12$) and FD ($n = 9$; Table 1), P ($n = 14$) and NP ($n = 8$), or heavier ($n = 14$) and lighter ($n = 8$) females (chi-square; all $P > 0.20$). While there was not a significant difference in the number of preferred females that were in either estrus or proestrus compared to the number of non-preferred females, the absolute numbers are in the direction that would be predicted (e.g., Taylor and Dewsbury, 1990). This suggests that males are assessing females based on traits (e.g., weight) other than estrous state.

3.2. Reproductive success

Female nutritional status (contingency $\chi^2 = 0.008$, $P > 0.05$) and female preference status (contingency $\chi^2 = 0.266$, $P > 0.05$) did not influence the likelihood that pairs produced a litter. However, the relationship between the weight of each male and his mate influenced the likelihood that they produced a litter. Pairs that differed by less than 5.5 g (midpoint of range of weight differences among pairs) were more likely to produce a litter than pairs that differed by more than 5.5 g regardless of nutritional or preference status.

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**Table 1**

Comparisons between non-food-deprived (NFD) and food-deprived (FD) female house mice based on differences in physical condition (weight and estrous state) and male preference (preferred, P, and non-preferred, NP).

<table>
<thead>
<tr>
<th>Comparisons</th>
<th>NFD</th>
<th>FD</th>
<th>Test</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{x}$ wt (g)</td>
<td>16.1 (0.32)</td>
<td>14.4 (0.30)</td>
<td>t-test</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>$%$ wt loss$^a$</td>
<td>-0.9</td>
<td>6.8</td>
<td>t-test</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>Number preferred by males</td>
<td>28</td>
<td>20</td>
<td>Chi-square</td>
<td>&gt;0.20</td>
</tr>
<tr>
<td>$\bar{x}$ of time spent investigating</td>
<td>35.1 (1.88)</td>
<td>32.0 (1.62)</td>
<td>t-test</td>
<td>&gt;0.10</td>
</tr>
<tr>
<td>$\bar{x}$ days from pairing to birth</td>
<td>24.6 (0.68)</td>
<td>26.4 (0.57)</td>
<td>t-test</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Female in proestrus or estrus</td>
<td>12</td>
<td>9</td>
<td>Chi-square</td>
<td>&gt;0.50</td>
</tr>
</tbody>
</table>

Standard error values are given in parentheses.

$^a$ Mean percent weight loss calculated for the 1-week period during which FD females were deprived of food.

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**Fig. 2.** Differences between the percentage of trial time each male spent investigating his preferred (P) female and his non-preferred (NP) female with respect to weight difference between the male and his preferred female. Males spent more time investigating their preferred female when she was closer to the male’s own weight ($P = 0.006$).
Timing to birth of FD females. In addition, regardless of preference, our results did not support our prediction even though the food deprivation protocol we used negatively impacted the weight and timing to birth of FD females. Although we predicted that males would prefer NFD females, we may have not detected any significant differences with regard to reproductive success between NFD and FD females because of the fact that all mice were fed ad libitum upon being paired with a male and therefore may have been well nourished at mating. The time from pairing to birth was shorter for NFD females than FD females, which, along with differences in their average weights, indicates that FD females were negatively affected by the food-deprivation protocol and may have been more focused on regaining weight rather than on mating. This is similar to what Pierce and Ferkin (2005) reported and suggests females needed to regain weight prior to mating. In addition, litter characteristics did not differ between females with regard to either nutritional or preference status. However, space and time constraints did not allow us to measure adult offspring quality with respect to nutritional status or preference status as done by Gowaty et al. (2003). Although we are measuring reproductive success using only a single reproductive period, we assume that our measurements of reproductive success in the short term may be indicative of the effects of nutritional status and preference status in the long term (i.e., lifetime reproductive success).

We also predicted that males may spend more time investigating the heavier females (most likely NFD) than the lighter females. Interestingly, the average male spent more time investigating his P female when her weight was closer to his weight. In addition, pairs that were closer in weight were more likely to produce a litter than pairs that were not as close in weight. This was not just a function of the weight of the females and males of a pair, since neither heavier females nor heavier males were more likely to produce a litter. This apparent assortative mating based on weight indicates that the relationship between the weight of the male and his mate not only influences the male’s preference, but also influences the male’s reproductive success. Although size-assortative mating is common in other animal taxa (amphibians, Arak, 1993; arthropods, Crespi, 1989), neither we nor other investigators (e.g., Beeching and Hopp, 1999) have been able to determine the mechanisms that are driving this apparent assortative mating. One possible explanation is that there may be a developmental benefit that influences offspring quality when parents are of similar size (sensu Castro and Toro, 2006).

Although the investigation times of males varied with respect to the weights of females, the weights of the females only explained a relatively small proportion of the variation in a male’s investigation time. Some other characteristics males could be assessing are the MHC alleles (Yamazaki et al., 1978; Egid and Brown, 1989).

### 4. Discussion

Nutritional status and diet quality have been studied with regard to reproductive physiology and sexual behavior of females (e.g., Wade and Schneider, 1992; Wade et al., 1996; Temple et al., 2002; Schneider, 2004; Wade and Jones, 2004; Pierce et al., 2007), but rarely with regard to male preference (e.g., Pierce et al., 2005). Although we predicted that males would prefer NFD females, our results did not support our prediction even though the food-deprivation protocol we used negatively influenced the weight and timing to birth of FD females. In addition, regardless of preference, males did not spend more time investigating NFD females than they spent investigating FD females. Thus, it appeared that male mate preference was not influenced by the nutritional status of females even though FD females were negatively impacted by the period of food deprivation. These results differ from those reported by Pierce et al. (2005) who found that male meadow voles preferred to investigate the anogenital odor of females that had been fed ad libitum after food-deprived females. Our results may differ from theirs due to differences in experimental design (e.g., use of odor cues only versus the use of caged females as stimuli) or taxonomic differences.

In our study the reproductive success of males did not vary with either female nutritional or preference status. We may have not detected any significant differences with regard to reproductive success between NFD and FD females because of the fact that all mice were fed ad libitum upon being paired with a male and therefore may have been well nourished at mating. The time from pairing to birth was shorter for NFD females than FD females, which, along with differences in their average weights, indicates that FD females were negatively affected by the food-deprivation protocol and may have been more focused on regaining weight rather than on mating. This is similar to what Pierce and Ferkin (2005) reported and suggests females needed to regain weight prior to mating. In addition, litter characteristics did not differ between females with regard to either nutritional or preference status. However, space and time constraints did not allow us to measure adult offspring quality with respect to nutritional status or preference status as done by Gowaty et al. (2003). Although we are measuring reproductive success using only a single reproductive period, we assume that our measurements of reproductive success in the short term may be indicative of the effects of nutritional status and preference status in the long term (i.e., lifetime reproductive success).

### Table 3

Comparisons of characteristics of litters for male house mice mated to preferred (P) and non-preferred (NP) females, that were either non-food-deprived (NFD) or food-deprived (FD).

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Mated to NFD Female (P:NP)</th>
<th>Mated to FD Female (P:NP)</th>
<th>Mated to P Female (NFD:FD)</th>
<th>Mated to NP Female (NFD:FD)</th>
</tr>
</thead>
<tbody>
<tr>
<td># of litters produced</td>
<td>16</td>
<td>15</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>k # of pups/litter</td>
<td>7.4 (0.32)</td>
<td>6.5 (0.62)</td>
<td>6.7 (0.48)</td>
<td>7.3 (0.52)</td>
</tr>
<tr>
<td>k pup wt. at birth</td>
<td>1.30 (0.04)</td>
<td>1.34 (0.03)</td>
<td>1.30 (0.03)</td>
<td>1.34 (0.04)</td>
</tr>
<tr>
<td>k # of pups at weaning/litter</td>
<td>7.1 (0.38)</td>
<td>6.9 (0.68)</td>
<td>6.9 (0.50)</td>
<td>7.2 (0.54)</td>
</tr>
<tr>
<td>k pup wt. at weaning/litter</td>
<td>9.04 (0.28)</td>
<td>8.89 (0.41)</td>
<td>8.57 (0.30)</td>
<td>9.41 (0.34)</td>
</tr>
<tr>
<td>k wt. of sons at weaning/litter</td>
<td>9.36 (0.31)</td>
<td>9.17 (0.39)</td>
<td>8.88 (0.31)</td>
<td>9.70 (0.34)</td>
</tr>
<tr>
<td>k wt. of daughters at weaning/litter</td>
<td>8.74 (0.26)</td>
<td>8.33 (0.28)</td>
<td>8.33 (0.30)</td>
<td>8.84 (0.21)</td>
</tr>
</tbody>
</table>

Female preference status and female nutritional status were analyzed separately. Standard error values are given in parentheses. All P values are greater than 0.05.
Potts et al., 1991) of females, major urinary proteins (Cheetham et al., 2007; Sherborne et al., 2007; Thom et al., 2008), or the genetic compatibility (Ryan and Altmann, 2001) between the males and females. Therefore, males, like females (e.g., Eidg and Brown, 1989; Coopersmith and Lenington, 1992; Kavaliers and Colwell, 1993; Wagner, 1998; Ehman and Scott, 2002), may be using numerous characteristics to choose mates. Our results suggest that male house mice may prefer to mate with females that are closer to their own weight and this apparent assortative mating is likely to have a positive influence on their reproductive success.

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References


