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# Courtship Behavior and Mate Choice of the Male Lizard *Anolis carolinensis* Based on Visual and Olfactory Familiarity

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## Introduction

Some studies of polygynous mating systems in amphibians and territorial lizards have shown that males prefer to mate with unfamiliar females than with familiar females as a strategy to increase their reproductive success. Cooper (1985) found that within their territory, male lizard of the species *Holbrookia propinqua* courted newly introduced females more frequently than familiar females. Tokarz (1992) found that when given a choice between a familiar and an unfamiliar female, males of the species *Anolis sagrei* mated with the unfamiliar female more frequently than with the familiar female. Donovan and Verrell (1991) found that males of the Mountain dusky salamander *Desmognathus ochrophaeus* show a great preference over unfamiliar females than for familiar females. In those studies, males had physical contact with females before and while the experimental tests were conducted.

I designed two experimental tests using the lizard *Anolis carolinensis*. The objective of the physical contact experiment was to determine mate choice based on familiarity by physical contact of males with females before and while the tests were conducted. The objective of the visual and olfactory contact experiment was to determine if only visual and olfactory contact of males with females would lead to mate choice based on their degree of familiarity.



## Methods

I conducted this research during the breeding season (April-October, 2002) using 17 males and 12 females collected from different places in Houston, Texas to avoid previous contact between them. At the beginning of each experimental trial, the focal male had never before seen each female used in the experiment.

### Physical Contact Experiment

Males and females were housed together for in glass cages measuring 50.8 x 25.4 x 25.4 cm with a screen top and covered with green paper to avoid visual contact of other lizards in adjacent cages. For a six day period, two females and one male were housed in each cage. After six days, a familiar female was replaced by an unfamiliar female never seen before by the male, leaving a familiar and an unfamiliar female in each cage. I conducted twelve trials in which I recorded the number of courtship displays toward each female in a period of ten hours on each test day. Courting was defined as a series of dewlap extensions (sometimes accompanied with head bobbing and pushups). If a male remained inactive (not courting) for a period greater or equal to three seconds after exhibiting courtship displays and started courting again, another courtship display was counted. Courtship displays were not counted when I was unable to determine which female a male was courting.

### Visual and Olfactory Contact Experiment

Procedures were similar to the physical contact experiment, but a screen barrier placed on the middle of the cage that divided it into two compartments was present. To allow visual and olfactory contact familiarity, two females were housed in one side of the cage and one male was in the other. Males were able to court females through the screen barrier for six days. After six days, one familiar female was replaced by an unfamiliar female never seen before by the male, and the screen barrier was removed. This allowed the male to have physical contact with a familiar and an unfamiliar female on the test day.

I conducted 36 trials under these experimental conditions, in which I recorded the number of courtship displays toward and copulations with each female in a period of ten hours on each test day.

## Abstract

Males in polygynous mating systems may prefer to mate with unfamiliar females than with familiar females as a strategy to increase their reproductive success. I designed two experimental tests using the lizard *Anolis carolinensis* to determine if physical contact familiarity would influence mate choice or if only visual and olfactory contact of males with females would lead to mate choice based on their familiarity. I concluded that *Anolis carolinensis* males base their mate choice on previous physical contact familiarity with females but not on visual and olfactory familiarity alone with females under laboratory conditions.

## Results

In the Physical contact experiment, males courted unfamiliar females more frequently than familiar females. The number of courtship displays toward familiar and unfamiliar females supported the rejection of the null hypothesis (Wilcoxon's signed-rank test;  $T=75$   $p<0.01$ ). The mean number of courtship displays toward familiar females (6.3) was different from that with unfamiliar females (14.6). Figure 1.



Figure 1. Physical contact experiment results. Each bar represents the mean number and standard error of courtship displays of males toward unfamiliar and familiar females on twelve trials.

The null hypothesis of the visual and olfactory contact experiment, which stated that the frequency in which males would court familiar and unfamiliar females would be the same, was accepted. The number of courtship displays toward familiar and unfamiliar females supported the acceptance of the null hypothesis (Wilcoxon's signed-rank test with normal approximation;  $z=0.53$ ,  $p=0.60$ ). The mean number of courtship displays toward familiar females (22.9) was not different from that with unfamiliar females (24.3). Figure 2a.

The null hypothesis of the visual and olfactory contact experiment, which stated that the frequency in which males would copulate with familiar and unfamiliar females would not be different, was accepted. The number of copulations with familiar and unfamiliar females supported the acceptance of the null hypothesis (Wilcoxon's signed-rank test with normal approximation;  $z=0.16$ ,  $p=0.87$ ). The mean number of copulations with familiar females (0.91) was not different from that with unfamiliar females (0.69). Figure 2b.

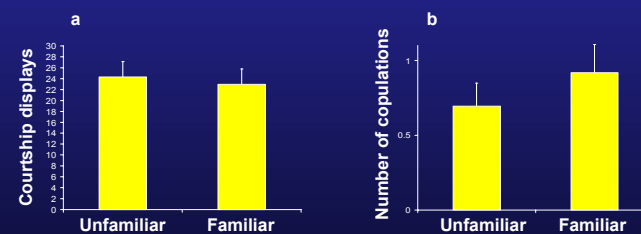


Figure 2. Visual and olfactory contact experiment results. a) Each bar represents the mean number and standard error of courtship displays of males toward unfamiliar and familiar females. b) Each bar represents the mean number and standard error of copulations of males with unfamiliar and familiar females.

## Discussion

Males chose to court unfamiliar females more frequently than familiar females based on previous physical contact with the familiar female, even if females appeared to be non-receptive.

These findings suggest that *Anolis carolinensis* males are able to discriminate between familiar and unfamiliar females, and that they prefer to court unfamiliar females more frequently than familiar females based on physical contact familiarity. These findings are supported by previous studies by Cooper (1985), Tokarz (1992), and Donovan and Verrell (1991).

Males of the species *Anolis carolinensis* are able to recognize specific individuals (Greenberg and Noble, 1944), as demonstrated in the physical contact experiment. However only visual and olfactory familiarity of males with females was not sufficient to influence their mate choice.



## Literature Cited

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