MALE TERRITORIAL RESPONSE TO FEMALE PRESENCE IN *DENDROBATES PUMILIO*

WENDY L. OSTERLING AND CARTER D. WRAY

Abstract. (WLO) Grabowsky (1991) observed no territoriality in all-male groups of *Dendrobates pumilio* in an experimental environment, but that the addition of a female initiated territoriality in the males. We examined this by testing the hypothesis that female presence would induce territoriality in male frogs resulting in males spacing themselves further apart and defending their territories more aggressively. We found no significant difference in the distance of the nearest neighbor between trials with and without females This indicates that male spatial distribution in this experimental environment was not immediately affected by the presence of females.

INTRODUCTION (WLO)

Male poison dart frogs (*Dendrobates pumilio*) are territorial and use vocalization and physical aggression to defend territories. Males uniformly distribute themselves 2 to 3 m from the nearest calling neighbor (Bunnell 1973).

Grabowsky (1991) studied the communication systems in *D. pumilio* and their aggressive responses to various stimuli. She found that in the absence of females, the male frogs tended to clump together in the cage. But when a female was present, the males appeared to respond immediately by distributing themselves throughout the cage. We tested these observations, predicting that males would become more territorial, spread out further, and defend their territories more aggressively in the presence of females than when only males are present.

METHODS (WLO)

On 12 February 1995, we caught 12 male and one female *D. pumilio* in Estacion Biologica La Selva, Costa Rica. We placed four male frogs in the center of a 77 x 44 x 42 cm tank and used x and y coordinates to record the position of each frog once a minute for five minutes. Two trials were run with each group of four male frogs; the first with males alone and the second with a female present. The paired trials were replicated with three groups of male frogs. With the position coordinates, we were able to calculate the distance of each frog to its nearest neighbor. We further calculated the mean distance to nearest neighbor for all males at one minute intervals.

We performed a repeated measures ANOVA to compare mean distance to nearest neighbor in trials without a female to those with a female.

RESULTS (CDW)

We found no significant difference in mean distance to nearest neighbor over 5 minutes between trials with (19.4 ± 1.5, mean ± 1 SE) and without females (18.0 ± 1.7; df=1,4; F=1.035; P=0.366). The trends over time for trials with and without females were also not significant (with female df=2,4: F=0.168; P=0.952; without female df=2,4; F=0.136; P=0.967; Fig. 1).

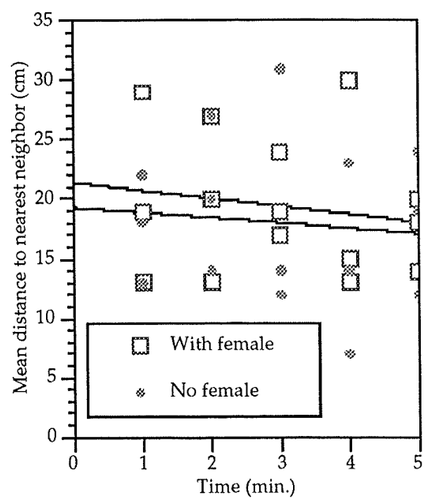

FIG. 1. Regression of distance between male poison dart frogs for trials with and without females (N=3).

We observed that throughout each trial, most of the males moved around in the tank. No clearly defined territories were apparent, although the males vocalized in all trials. In one trial without a female, two males engaged in an aggressive interaction of grappling followed by one male grasping the other as if they were in amplexus.

DISCUSSION (CDW)

The distance to the nearest neighbor of male frogs did not differ significantly between trials with and without females. This indicates that male spatial distribution in this experimental environment is not immediately affected by the presence of females. Our findings thus did not support our hypothesis. They also differed from Grabowsky's observation of territory initiation which occurred at higher male densities than we used. The results may have been influenced by the confined nature of our experimental set-up. The male frogs may have been disoriented in the foreign tank habitat and possibly needed more time to establish defined territories.

The consistent calling and, especially, the incident of grappling indicate high levels of aggression between males regardless of female presence. The males may have been attempting to set up full-sized territories and were exhibiting aggressive behavior to expel other males. To assess the reaction of male *D. pumilio* to female presence, an experimental set-up large enough to encompass full-sized territories may be necessary.

LITERATURE CITED

Grabowsky, T. 1991. Communication systems of *Dendrobates pumilio*: aggressive responses to various stimuli. Pages 19-22 *in* T. Grabowsky and G. York, editors: Dartmouth Tropical Biology. Hanover, NH, USA,

Bunnell, P. 1973. Vocalizations in the territorial behavior of the frog *Dendrobates pumilio*. *Copeia*, 1973: 277-84 *in* M. L. Crump, 1983. Species accounts of *Dendrobates granuliferus* and *Dendrobates pumilio*. Pages 396-398 *in* D. H. Janzen, editor. Costa Rican Natural History. University of Chicago Press, Chicago, Illinois, USA.