COURTSHIP BEHAVIOUR OF NASONIA VITRIPENNIS: SOME BRIEF NOTES ON PHEROMONE PRODUCTION

by

H. JACHMANN

(Nazinga Game Ranch, A.D.E.F.A., B.P. 5570, Ouagadougou, Burkina Faso.)

SUMMARY

Pheromone production in courtship by a male Nasonia decreases with age, either in quantity or in activity. The female becomes more sensitive with age for one or more courtship stimuli produced by the male. This latter process appears to overrule the loss in pheromone production or activity in the male.

INTRODUCTION

The courtship display of the chalcoid wasp, Nasonia vitripennis (Walker), has been described by BARRASS (1960) and VAN DEN ASSEM et al. (1980 & 1981). Briefly, after a short chase the male mounts the female and takes up a frontal position on top, protruding his head over her antennae and placing his front tarsi on her head. From this position, the male makes a number of specific courtship movements producing three types of stimuli, i.e. tactile and chemical cues (VAN DEN ASSEM et al., 1980) and sounds (VAN DEN ASSEM & PUTTERS, 1980). After a certain amount of courtship a virgin female signals receptivity by lowering her antennae.

The sounds are produced by vibration of the thoracic exoskeleton, using the flight musculature. The thoracic cavity may act as a resonator of vibrations. Males that are silenced by application of a small quantity of gum arabic on top of their thorax, show a normal courtship display. To evoke receptivity in the female, however, they need to produce more courtship than untreated males (JACHMANN, unpubl.).

A major component of the male’s courtship is head nodding. These nods come in series of four to seven, separated by 5 to 10 sec intervals (VAN DEN ASSEM et al., 1976 & 1981). During the upstroke of each nod the male extends his mouth parts, and during the first nod of a series only, the male discharges a pheromone that is necessary to provoke sexual receptivity in virgin females (VAN DEN ASSEM et al., 1980 & 1981). This pheromone appears to be the primary stimulus inducing sexual receptivity in Nasonia females (VAN DEN ASSEM et al., 1980 & 1981).
During several experiments with *Nasonia* it appeared that as males get older they need to produce more courtship to induce receptivity in younger females of a standard age. On the other hand, it appeared that newly emerged males had to produce relatively little courtship with older females. This difference was more pronounced when silenced males were used than with normal males. We hypothesize that these differences in courtship production are related to age dependent changes in pheromone production in the male and to age dependent changes in the sensitivity for one or more courtship stimuli in the female. Throughout its life, there are no qualitative changes in the courtship behaviour of a *Nasonia* male. With the exception of sound stimuli, we may assume that other tactile stimuli produced by the male during courtship remain unaltered throughout its life. If slight changes in the latter do occur, their effect might be of minor importance in the total complex of stimulation. Removing the sound stimuli will enable us to investigate these age dependent changes in both sexes of *Nasonia*.

**MATERIALS AND METHODS**

The cultures of *Nasonia* were maintained with blowfly pupae (*Calliphora erythrocephala*) as hosts. Males were silenced by placing a drop of gum arabic on their thorax, after their wings had been removed. After each experiment, the male was checked for sound production through a courtship, displayed on a membrane of an electrodynamic microphone (Paso M3). Any vibrations produced during this courtship would be recorded on tape and made audible when amplified (*van den Assem & Putters*, 1980).

In order to quantify courtship produced by males, the number of series of head nods (s) as well as the time period (t) that elapsed from mounting the female to the receptivity signal of the female were used. In each experiment the male was used for two consecutive courtships (the second courtship being the control for sound production), whereas for each courtship only one female was used because receptivity occurs once in a female’s lifetime. Control experiments showed that there were no differences between two consecutive courtship displays of a male *Nasonia*. The adult wasps were maintained at room-temperature (about 20°C).

**RESULTS**

During our first experiment, silenced and untreated males (control males) of 1 to 13 days old courted and mated with females varying in age from 1 to 3 days. The silenced males all came from a single batch (culture vial) that was maintained for 13 consecutive days, wheras the control males came from different batches. The time that elapsed from mounting the female to the receptivity signal (t), as well as the number of head nod series (s) were used to quantify courtship. The relationship between the age of silenced males and the amount of courtship