Possible Absence of Attraction to Odor in *Panstrongylus megistus* (Hemiptera: Reduviidae) under Laboratory Conditions

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We tested the attraction of Panstrongylus megistus *odor under laboratory conditions, between males and females of this species and by individuals of each sex on recently fed virgin couples. We employed a system of choice boxes both with or without forced aeration. We observed no differences between the experimental groups with or without aeration over the stimuli in the tested situations. We also observed a clear trend among the insects to remain in the central box where they had been placed in the beginning of the tests.*

Key words: triatomines - *Panstrongylus megistus* - odor - attraction - Chagas' disease

It is known that insects give out and receive chemical signals in order to detect a potential sexual partner, to identify predators and other individuals of the same species, to detect its place of origin and its food source. These signals are captured through olfactory abilities and could be associated with traps or insecticides used as control measures (Masson & Brossut 1981).

According to Butler (1967) the term pheromone was created in 1959 by Karlson and Butenandt to define those substances secreted by an organism of a given species which may elicit a characteristic reaction, such as a defined behavior among conspecific individuals. Studies of these chemical signals are particularly relevant when they are involved in the attraction and control of insects of medical, veterinary or agricultural importance. This applies particularly to pheromones which promote the attraction between individuals of different sexes (Schofield & Moreman 1976).

The present study deals with the possible attraction between males and females and by individuals of each sex in relation to virgin couples of *Panstrongylus megistus* (Burm, 1835), one of the main vectors of Chagas' disease in Brazil and in other South American countries.

MATERIALS AND METHODS

In order to test the possible attraction exerted by *P. megistus* odor we employed the methodology described by Mac Cord et al. (1986), which was slightly modified. We devised a system of choice boxes, which was composed of five 11x11x15 cm, stiff, smooth, plastic boxes (a, b, c, d, e - Fig.) whose lids were removable. The smooth inner walls prevented triatomines to climb them. These boxes were interconnected by PVC tubes (t) measuring 6 cm and 4 cm in diameter. The central box (*a*) placed on a higher position was provided with two lateral outlets measuring 4 cm in diameter, shut by small windows (w). These windows ran on small trails and opened at the command of wire threads (wt). The triatomines to be tested were placed in this box. Boxes *b* and *c* acted as traps to these insects. The source of attraction stimulus was placed in box *d*. Box *e* remained empty. An air pump (ap) was responsible for the aeration of the boxes, which went through a plastic tube measuring 63 cm and 0.5 cm in diameter.

Each test was carried out along 24 hr. Temperature was kept between 25 and 27°C and the relative humidity of the air remained between 80 and 85%. Fifth instar *P. megistus* nymphs, which had been supplied by the National and International Reference Laboratory on Triatomine Taxonomy, Instituto Oswaldo Cruz, were classified by sex and were fed fortnightly on pigeon blood until they had reached the adult phase. Adults were marked individually (Mac Cord et al. 1983) and remained separated on the basis of sex until they were employed in the tests.

On the day we started the tests we selected 150 newly emerged males and 150 newly emerged females, which had been fed on pigeon blood. We established 12 groups of 25 specimens each. Six groups were exposed to aeration whereas the other six groups were not. We adopted the criterion of non-repetition of the insects to be utilized in the tests, in order to avoid the possibility of their learning. Three replicates

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of each group were established according to the following planning procedure:

With no forced aeration - Control group: I. 25 virgin males - with no attraction stimulus; II. 25 virgin females - with no attraction stimulus. Experimental groups: III. 25 virgin males - stimulus: 25 virgin females; IV. 25 virgin females - stimulus: 25 virgin males; V. 25 virgin males - stimulus: 25 virgin couples; VI. 25 virgin females - stimulus: 25 virgin couples.

With forced aeration - The six groups in this condition were constituted in the same way as the ones described in no forced aeration, but with forced aeration through the box which contained the stimuli.

RESULTS

Table I shows the results obtained in the control groups. These data represent the analysis of random distribution of *P. megistus* among the choice boxes (boxes *b* and *c*) in the absence of the attraction stimulus in box *d*. Tables II, III, IV and V show the data of attraction exerted by the odor of *P. megistus* individuals on the opposite sex or by couples of this species.

The analysis of the tables, both in the control group and in the experimental groups, shows that in no situation was there any attraction between *P. megistus* specimens. This analysis also shows a clear trend among the insects to remain in the central box, where they had been placed in the beginning of the tests.

TABLE I

Random distribution of *Panstrongylus megistus* (n = 25) among the choice boxes, with or without forced aeration and in the absence of the attraction stimulus (control groups: I, II)

Aeration	*P. megistus*	Box *c*	Box *a*	Box *b*
Without	Males	2	15	8
	Females	4	17	4
With	Males	4	16	5
	Females	5	17	3

TABLE II

Sexual attraction exerted by virgin females (n = 25) on virgin males (n = 25), both recently fed. The male insects were placed inside box *a* from where they could go either to box *b* or *c* (group III)

Aeration	Box *c*	Box *a*	Box *b*
Without	3	17	5
With	4	16	5

TABLE III

Sexual attraction exerted by virgin males (n = 25) on virgin females (n = 25), both recently fed. The female insects were placed inside box *a*, from where they could go either to box *b* or *c* (group IV)

Aeration	Box *c*	Box *a*	Box *b*
Without	5	15	5
With	4	16	5

TABLE IV

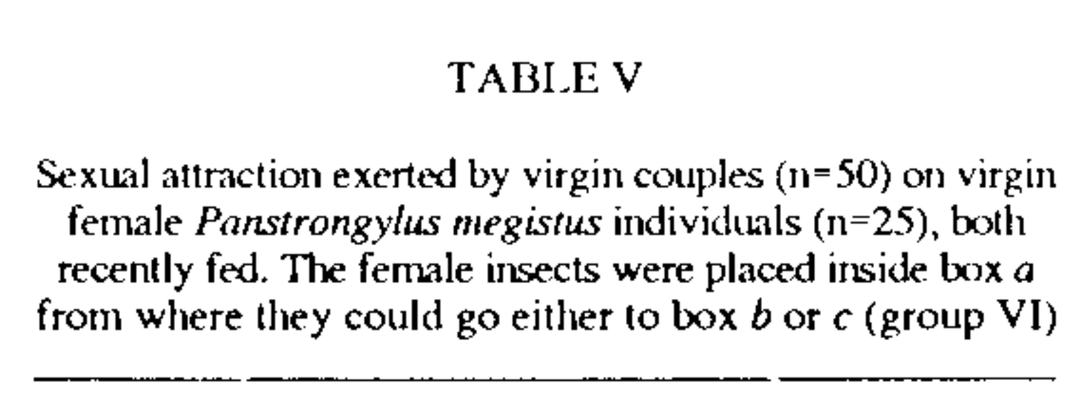
Sexual attraction exerted by virgin couples (n = 50) on virgin male *Panstrongylus megistus* individuals (n = 25), both recently fed. The male insects were placed inside box *a* from where they could go either to box *b* or *c* (group IV)

Aeration	Box *c*	Box *a*	Box *b*
Without	5	15	5
With	2	15	8

TABLE V

Sexual attraction exerted by virgin couples (n=50) on virgin female *Panstrongylus megistus* individuals (n=25), both recently fed. The female insects were placed inside box *a* from where they could go either to box *b* or *c* (group VI)

Aeration	Box *c*	Box *a*	Box *b*
Without	8	12	5
With	6	15	1



Choice boxes utilized in studies of odor attraction between individuals of different sexes of *Pantrongylus megistus*. *a:* central box; *b* and *c:* trap boxes; *d:* stimulus box; *e*: empty box; wt: wire thread; w: window; t: PVC tubes; ap: air pump.

DISCUSSION

The first studies that dealt with triatomine's pheromones were carried out by Antich (1965). This author studied the attraction between male and female individuals of *Triatoma phyllosoma pallidipennis* among which air was passed. A slight attraction was observed among males for the air which had passed over virgin females. Antich (1968), employing the same methodology, observed the attraction of *Rhodnius prolixus* females for the air which had passed over males of the same species.

Baldwin et al. (1971), in their observations on *R. prolixus*, were not able to detect any attraction by one sex to the other. These authors reported the phenomenon of attraction only among males in relation to couples undergoing copulation. They concluded that a pheromone was produced during copulation, which could attract and excite male specimens. The sexual stimulation observed among the latter seemed so intense that the males attempted copulation with other male specimens, notwithstanding the presence of single female specimens. Also according to the same authors the female specimens did not react to the attraction stimulus in any experiment and did not show any sign of sexual excitement in the presence of copulating couples. Schofield and Moreman (1976) repeated the tests done by Baldwin et al. (1971), confirming the observations on *R. prolixus* only. Their tests on *T. infestans*, however, did not detect the presence of the pheromone which attracted males towards copulating females.

The attraction exerted by copulating couples on males was observed by Richards in 1927. His observations on *Micropterix* (Lepidoptera) showed that male specimens were more excited by the presence of copulating couples than by single females.

Loher and Gordon (1968) observed that copulating couples of *Oncopeltus fasciatus* attracted males in the direction of the females involved in the sexual behavior. Observations by the same author on *Dysdercus fasciatus*, another hemipteran species, revealed that only copulating couples in which the females had emerged at least three days earlier were able to attract other male specimens. Matings involving recently emerged females, on the other hand, did not cause the same reaction among these male insects.

T. mazzotti couples were exposed to an air current that went through a cage containing both an hexane extract of substances obtained from the abdominal wall and an aqueous solution of faeces of this species. The attraction of males by females was reported by Ondarza et al. (1986). The sexual pheromone obtained from these female specimens was also attractive to virgin male specimens of *T. pallidipennis* and *T. barbieri*, which was interpreted as apparently interspecific by the authors. Ondarza et al. (1986) also observed that virgin male specimens of *R. prolixus* and *D. maximus* were less attracted by the pheromone.

According to the proposed situations, our present results do not suggest any form of chemical attraction. However, direct observations under laboratory conditions showed that *P. megistus* males were attracted to females, which was verified by movements of their antennae, approximation and jumping of the males over the females (Lima et al. 1986a). In another paper, we also observed that copulating couples seemed to emit some attraction procedure, because the males placed on the cage seemed confused and attempted copulation with other male specimens or even with the copulating couples, despite the presence of single females; the action of this probable mechanism of attraction seemed to be so efficient that these male specimens did not distinguish females from other males (Lima et al. 1986b).

Our present experiments were initially performed in a system of choice boxes without aeration. As pheromone is a volatile substance, in a subsequent test we passed a gentle stream of air over the stimuli, because we supposed the air would aim the distribution of the odor among the other boxes since our system of choice boxes was closed, and it would not allow the natural circulation of the air. Even after the use of this measure it was not possible to detect any attraction in the groups studied. According to Antich (1968), the air impregnated with odor could have an attractive effect over the insects placed on the opposite side in the boxes. The same author (Antich 1968) also stated that the experiences about the employment of the air were not influenced only by it, which, alone could not attract or repel the insects, but it could carry and make the release of the odor originating from the stimuli easier.

Neves and Paulini (1981), studying the attraction among adults both of *T. infestans* and *P. megistus*, observed the production of a sexual pheromone in both species, which stimulated approximation of male specimens toward the females ones and vice-verse, producing a characteristic excitement among specimens of both sexes. Our results do not confirm the data obtained by them, namely that *P. megistus* female specimens, under the effect of the pheromone, approach male specimens and display a characteristic excitement. Our observations resemble more the ones reported by Loher and Gordon (1968), which assign a passive sexual role to *O. fasciatus* females, as is usually recognized as the rule among other hemipteran species.

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