

## TRIATOMINAE (HEMIPTERA, REDUVIIDAE): SEX IDENTIFICATION IN IMMATURE FORMS OF VECTORS OF CHAGAS DISEASE

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### SUMMARY

The determination of sex in 3rd instar nymphs of the *Triatoma* genus is reported. The critical morphological structures for sex identification in the early immature forms are located in the 9th abdominal segment. The distinction between the two sexes is the pattern of the 9th sternite which appears short and wide in the males and long and narrow at the median line in the females. Evidence was furnished that the structure of the 9th sternite is morphologically constant and is present in all members of the *Triatoma* genus here studied.

### INTRODUCTION

At the time our observations started the determination of sex in 5th instar nymphs was possible. GALLIARD<sup>4</sup> was first to report that the characters located in the 9th abdominal segment are the critical morphological structures for sex identification in the 5th instar nymphs of *Triatoma protracta*, *Triatoma dimidiata* and *Rhodnius prolixus*.

Since that time much additional evidence has been accumulated as a result of studies on other species by CORRÊA<sup>1</sup>, CORRÊA et al.<sup>2</sup>, RYCKMAN<sup>3</sup> and ESPINOLA<sup>3</sup>.

In all instance the distinguishing character for sex separation was located in the 9th sternite which shows two lateral narrow bands in the females and an unique short band, wide in the median line, in the males.

An additional characteristic of value for distinction of female and male nymphs was the presence in the former of two projections along the posterior margin of the 8th sternite, called "posterior callosities" by CORRÊA<sup>1</sup>.

These structures, when present, were not distinctive enough to be of value as taxonomic characters for sexing of younger specimens. However, in the present study it is shown that females are readily distinguishable from males, as early as in the 3rd and 4th nymphal stages. The distinction between the two sexes is the pattern of the 9th sternite which, under a dissecting microscope, appears short and wide in the males and long and narrow at the median line in the females.

### TECHNICS AND RESULTS

It is of interest to note that learning to distinguish the sexes was best accomplished by examining cast-off skins, left by nymphs during the process of moulting, in which clear-cut differences were apparent. Therefore, photographs of male and female exuviae are included in Fig. 1 to Fig. 4 to give the reader an opportunity to visualize quickly the differences to look for in separating male from female nymphs.

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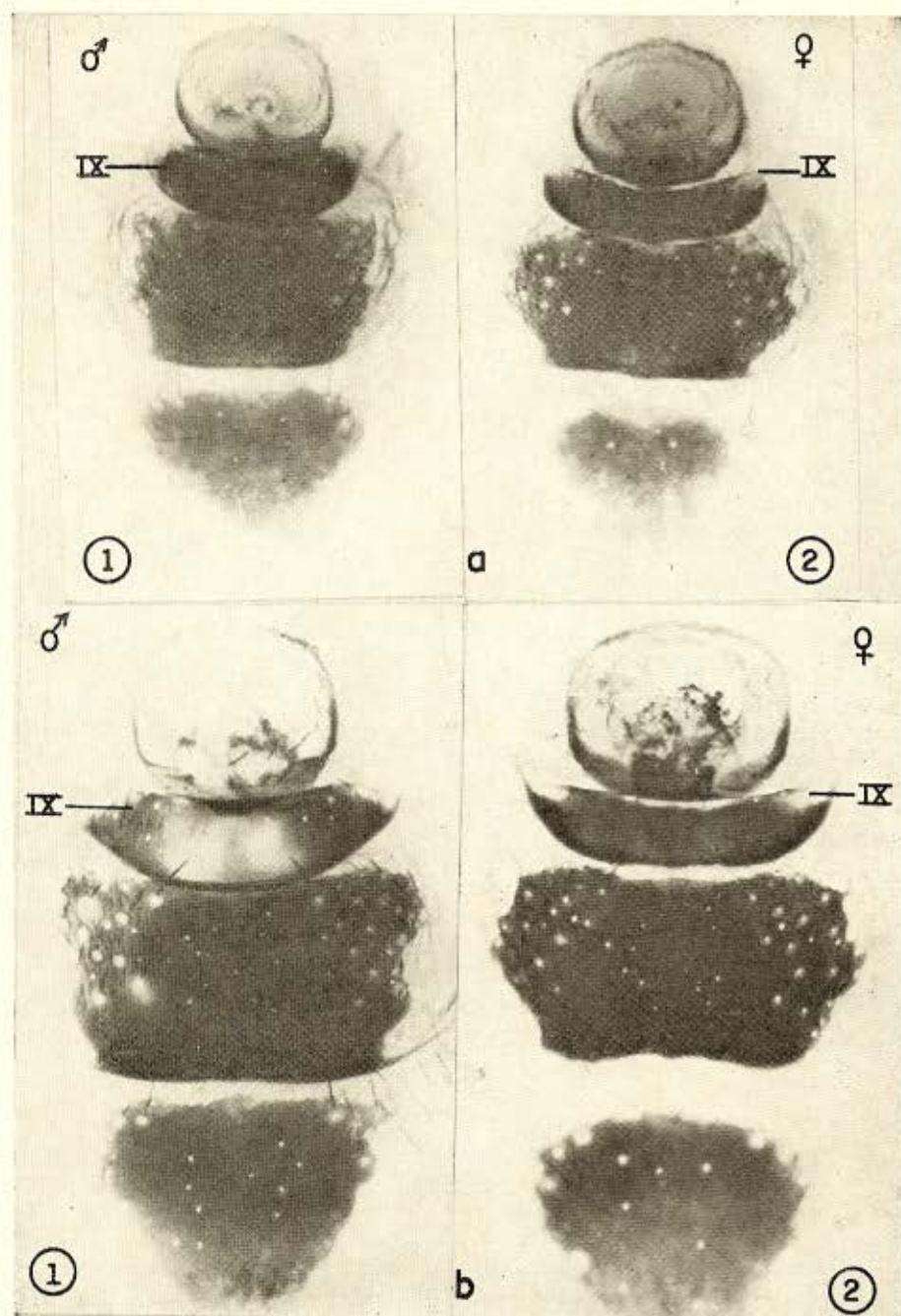


Fig. 1 — An illustration of the IX sternite of *Triatoma infestans* male (1) and female (2) nymphs; a-3rd instar, b-4th instar.

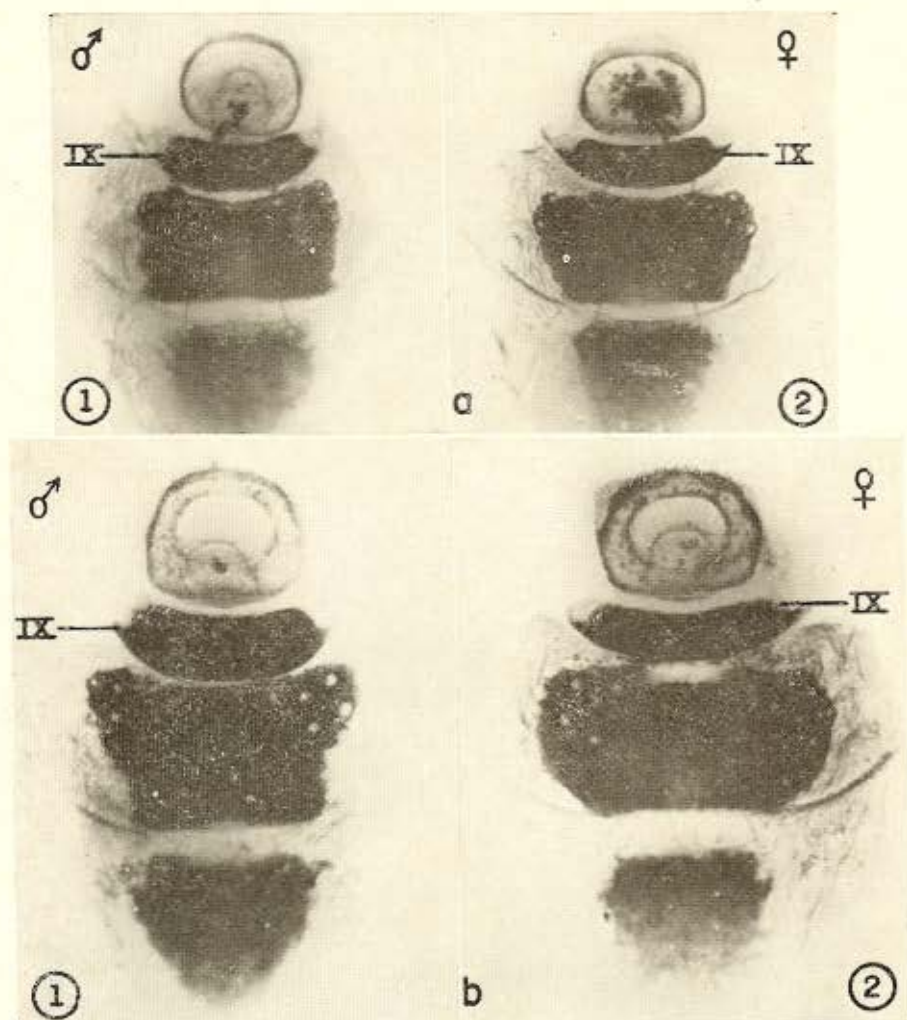


Fig. 2 — An illustration of the IX sternite of *Triatoma sordida* male (1) and female (2) nymphs; a-3rd instar, b-4th instar.

Following the criteria in sexing 3rd and 4th instar nymphs, ample evidence was furnished to indicate that the structure of the 9th sternite is morphologically constant and is present in all members of the *Triatoma* genus here studied: *T. infestans* (Fig. 1), *T. sordida* (Fig. 2), *T. maculata* (Fig. 3 and *T. brasiliensis* Fig. 4).

Perhaps the best criterion by which our finding can be evaluated is that hundreds of nymphs sexed in the 3rd instar, and left for further development until the emergence of adults, revealed a relatively low degree

of inaccuracy of 2-3%. The separation of males from females in 4th instar nymphs revealed a complete degree of accuracy on comparison with the male and female populations emerged from those nymphs.

The procedure of sexing insects in their early stages of development proved convenient in our laboratory because the desired number of immature males and females could be isolated and held for emergence for subsequent hybridization, for testing the sexual aggressiveness of males as indicated by the number of virgin females they mate and in other studies in progress.

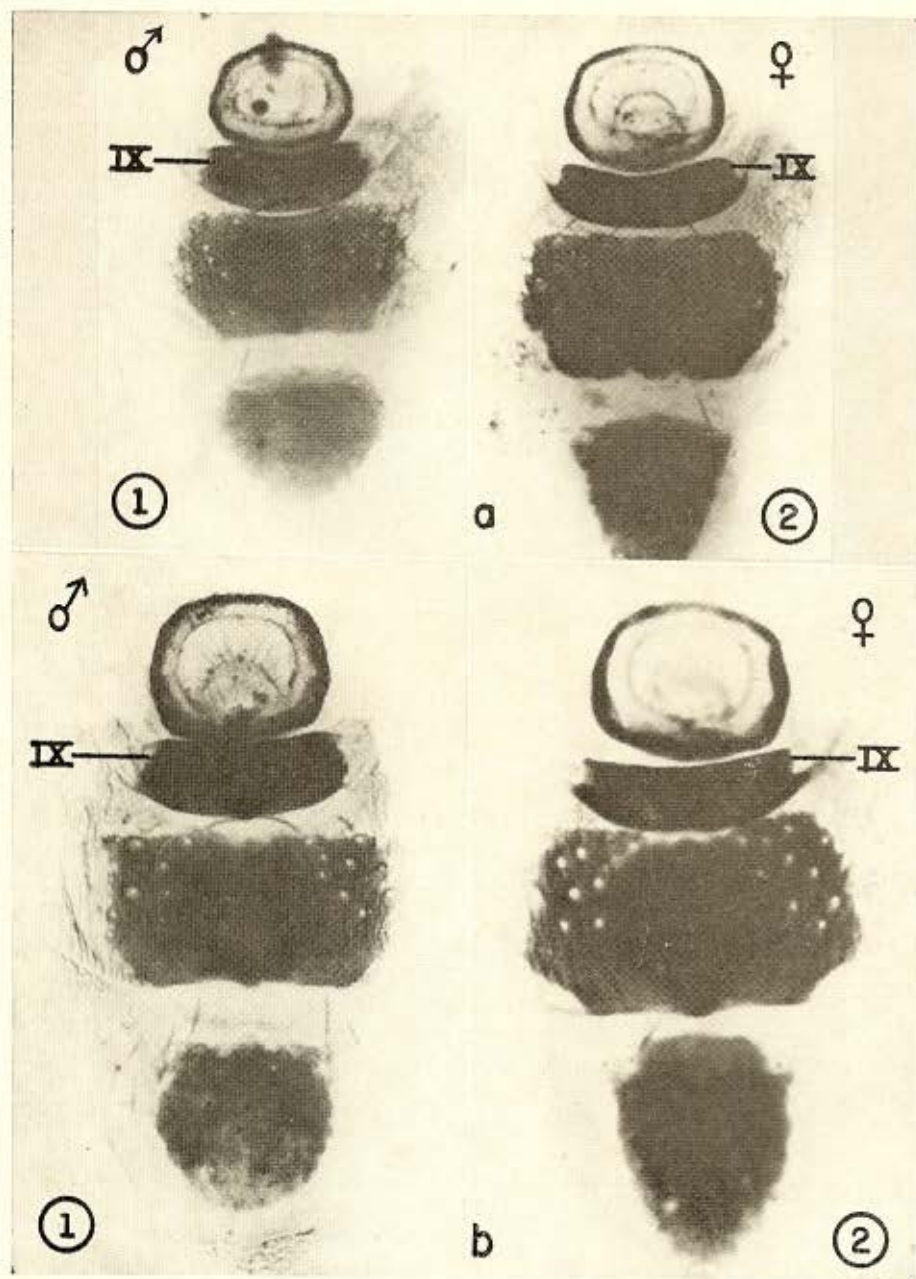


Fig. 3 — An illustration of the IX sternite of *Triatoma maculata* male (1) and female (2) nymphs; a-3rd instar, b-4th instar.

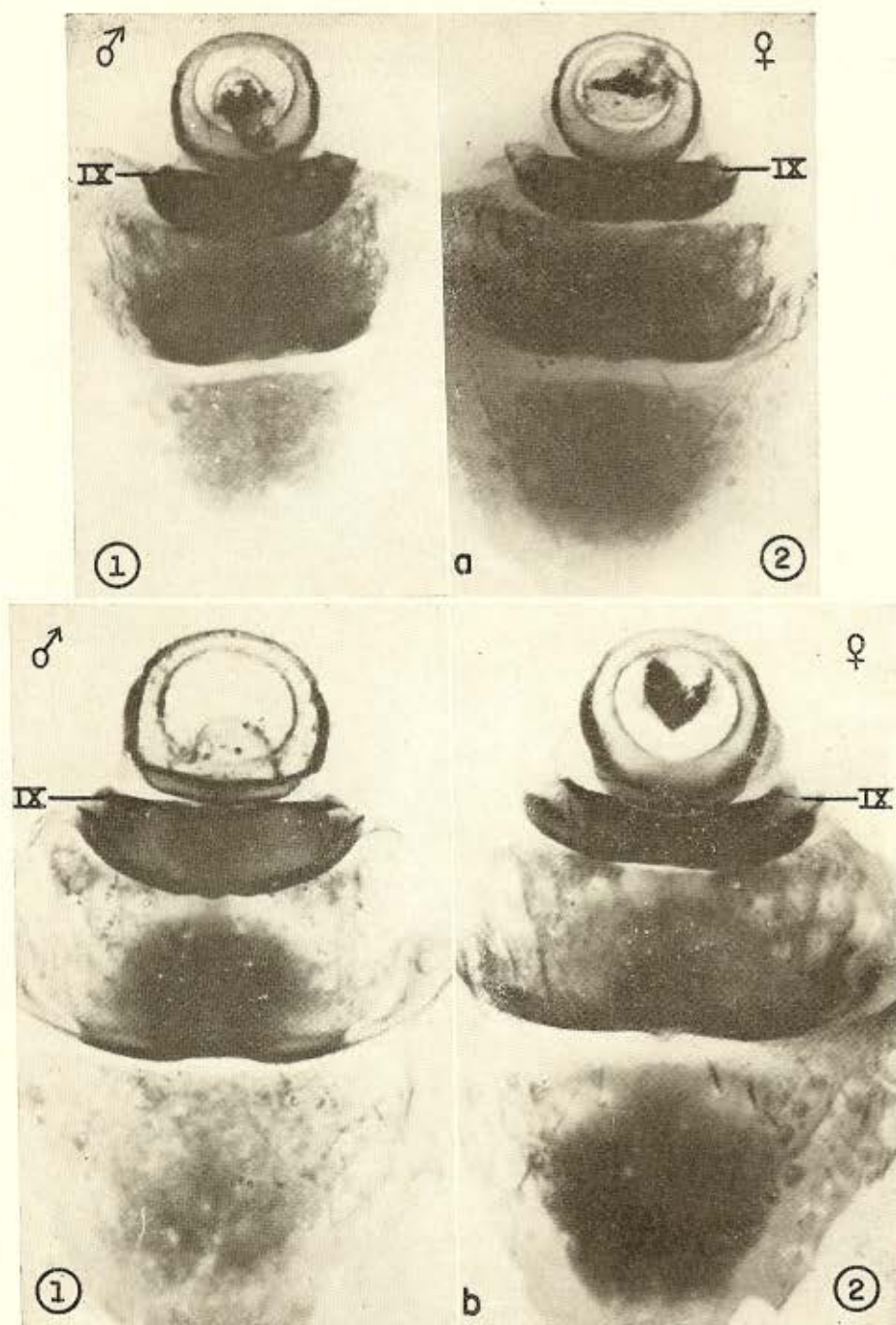


Fig. 4 — An illustration of the IX sternite of *Triatoma brasiliensis* male (1) and female (2) nymphs; a-3rd instar, b-4th instar.

COMMENTS

Before the technics, herein described was adapted, it was necessary to keep single nymphs in vials until they had become adults and this was tedious.

The desired numbers of virgin specimens could also be obtained from mixed populations reared in the routine colonies. Complete separation of virgin insects by this procedure appeared to be assured because the insects do not mate immediately after emergence<sup>6</sup>. However, long-term maintenance of mixed populations has proved time consuming due to the necessity for adequate population control.

Therefore, it is believed that the procedure of sexing immature forms, when a certain number of adults of one sex is desired, will be of interest and value particularly to investigators who are involved in sexual sterilization as a tool for the control or eradication of insects harmful to humans.

The practicality of sterile male releases for the control of vectors of Chagas Disease may, at the present time, appear less promising than it was found to be in controlling screw-worm flies<sup>8</sup> and melon flies<sup>9</sup>, because female *Triatoma* are capable of multiple matings during their long-term productivity period and males are capable of inseminating many females<sup>7</sup>. However, a method that has been shown to produce more rapid decline of pest population than conventional pesticidal applications, should not be dismissed before testing its effectiveness. Therefore, it is believed that the procedure of early sexing will be of help in the production of sterile males in numbers to overwhelm the natural male populations, and also in subsequent testing of the sexual vigor of sterilized males, of sexual incompatibility between sterilized and wild populations and in studies on behavioral deficiencies of sterilized bugs.

RESUMO

*Identificação do sexo em formas imaturas de vectores da Doença de Chagas*

Foi observado que triatomíneos já apresentam dimorfismo sexual no 3.º estágio ninfal. As diferenças sexuais prendem-se

ao comprimento do 9.º esternito e a largura dêste na linha mediana.

Como regra geral, nas ninfas machos do 3.º estágio, o 9.º esternito é curto e largo na porção mediana, enquanto que nas ninfas fêmeas do mesmo estágio, o 9.º esternito é longo e estreito na sua porção mediana.

Tais características foram observadas em *Triatoma infestans*, *Triatoma sordida*, *Triatoma maculata* e *Triatoma brasiliensis*.

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