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Mini Review: Karyotypic Survey in Triatominae Subfamily (Hemiptera, Heteroptera)

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Abstract

The Triatominae subfamily consists of 145 species distributed in 18 genera and grouped in six tribes. Currently, there are 86 karyotypes described in the literature, distributed in 11 genera. There are five chromosomal complements described for these bloodsucking insects, out more, 22 (20A+XY), 23 (20A+X_1X_2Y), 24 (20A+$X_1X_2X_3Y$), 21 (18A+X_1X_2Y), 25 (22A+X_1X_2Y). Thus, we review all triatomine species with the number of chromosomes described in the literature. Through these data highlight the importance of further analysis cytogenetic with karyotype description in Triatominae subfamily, since it can help as an important tool cytotaxonomy and mainly allows the understanding of the evolution of this important group of insect vectors of Chagas disease.

Keywords: Karyotype; Holocentric chromosome; Diploid chromosome set

Mini review

Triatomines are insects that are taxonomically included in the Hemiptera order and the Heteroptera suborder within the Reduviidae family and in the Triatominae subfamily [1]. These organisms are of great medical importance, because all of the species that belong to the Triatominae subfamily are both bloodsucking and susceptible to infection from the protozoan *Trypanosoma cruzi* Chagas, 1909 (Kinetoplastida, Trypanosomatidae) and are therefore potential vectors of Chagas disease [2].

The Triatominae subfamily consists of 145 species [3-8] distributed in 18 genera and grouped in six tribes [9,10] (Table 1).

In cytogenetics, biological models of triatomine bugs are important because they have holocentric chromosomes, which have diffuse kinetochores distributed along the chromosomes and not a single kinetochore located in the centromeric region. These insects also perform an unusual meiosis in which the segregation of sex chromosomes is post-reductional [11,12].

Tribe	Genus	Number of Species	Karyotype Described
Alberproseniini	*Alberprosenia*	2	0
Bolboderini	*Belminus*	8	2
	Bolbodera	1	0
	Microtriatoma	2	0
	Parabelminus	2	0
Cavernicolini	*Cavernicola*	2	0
Linshcosteini	*Linshcosteus*	6	0
Rhodniini	*Psammolestes*	3	2
	Rhodnius	18	14
Triatomini	*Dipetalogaster*	1	1
	Eratyrus	2	2
	Hermanlentia	1	0
	Meccus	6	6
	Mepraia	3	3
	Nesotriatoma	3	2
	Panstrongylus	14	8
	Paratriatoma	1	1
	Triatoma	70	45
Total		145	86

Table 1: Revision of the Triatominae subfamily (species and karyotypes).

The description of the diploid chromosome set in Triatominae subfamily was initiated in 1909 with the description of the karyotype of *Triatoma sanguisuga* LeConte, 1856 [13]. In 1950, the karyotypic studies were resumed and new karyotypes were described in the literature [14].

Ueshima, in 1966, described the karyotype of twenty new species and proposed cytogenetic studies as a tool in the taxonomy of these vectors (cytotaxonomy). Moreover, the author analyzes the genetic viability during meiosis of experimental hybrids resulting from crosses between species of triatomines [12].

Currently, there are 86 karyotypes described in the literature, distributed in 11 genera (Table 1). Three tribes and seven genera show no cytogenetic studies maybe due to the limited geographic location which difficulty the granting of specimens of the species. The three principal genera known and studied maybe by large epidemiological importance are *Triatoma*, *Rhodnius* and *Panstrongylus*. However, even in these three genera, we emphasize the importance of new karyotypic studies, since, according to Table 1, we are aware of approximately 65%, 57% and 78%, the number of chromosomes in their respective genera.

Ueshima, in 1996, propose that the type number of chromosomes of Triatominae subfamily is 22 (20A+XY). However, he points out that there are five chromosomal complements described for these bloodsucking insects, out more, 22 (20A+XY), 23 (20A+X_1X_2Y),

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Karyotype (2n)	Genus: species
21=18A+X_1X_2Y	***Panstrongylus**: megistus* ***Triatoma**: nitida*
22=20A+XY	***Psammolestes**: coreodes, tertius* ***Rhodnius**: brethesi, colombiensis, domesticus, ecuadoriensis, milesi, montenegrensis, nasustus, neglectus, neivai, pallescens, pictipes, prolixus, robustus, stali* ***Dipetalogaster**: maximus* ***Paratriatoma**: hirsuta* ***Triatoma**: arthurneivai, baratai, brasiliensis (b. brasiliensis, b. macromelanosoma), carcavalloi, circummaculata, costalimai, delpontei, garciabesi, guasayana, guazu, infestans (i. melanosoma), juazeirensis, jurbergi, klugi, lectularia, lenti, maculata, matogrossensis, melanica, patagonica, petrochiae, platensis, pseudomaculata, rubrovaria, sherlocki, sordida, vandae, williami*
23=20A+X_1X_2Y	***Belminus**: herreri, corredori* ***Eratyrus**: cuspidatus, mucronatus* ***Meccus**: bassolsae, longipennis, mazzottii, pallidipennis, phyllosoma, picturatus* ***Mepraia**: gajardoi, parapatrica, spinolai* ***Nesotriatoma**: bruneri, flavida* ***Panstrongylus**: chinai, geniculatus, howardi, lignarius, rufotuberculatus, tupynambai* ***Triatoma**: barberi, dimidiata (d. capita, d. dimidiata, d. maculipennis), gerstaeckeri, hegneri, mexicana, peninsularis, protracta, rubida, ryckmani, sanguisuga, sinaloensis, tibiamaculata*
24=20A+$X_1X_2X_3Y$	***Panstrongylus**: lutzi* ***Triatoma**: eratyrusiformis, melanocephala, vitticeps*
25=22A+X_1X_2Y	***Triatoma**: rubrofasciata*

Table 2: Chromosome number of 86 species of Triatomines with karyotypic analysis. A: autosomes.

24 (20A+$X_1X_2X_3Y$), 21 (18A+X_1X_2Y), 25 (22A+X_1X_2Y). Thus, we review the literature and grouped species according to the number of chromosomes (Table 2).

As can be observed in Table 2, some genera are poorly described derivatives as compared to the common ancestor, if we consider that the common ancestor of these bloodsucking insects presented 22 chromosomes (type number). On the other hand, if we analyze the tribe Triatomini, we observed that different chromosomal complements can be found, corroborating the hypothesis that the tribe is polyphyletic Triatomini.

Recently, through karyosystematic, Alevi and collaborated proposed a subcomplex of species were reorganized. The authors described the karyotype of the species *Triatoma lenti* Sherlock and Serafim, 1967 [15] and *Triatoma melanocephala* Neiva and Pinto, 1923 [16], and observed that *Triatoma melanocephala* Neiva and Pinto, 1923, as well as *Triatoma vitticeps* Stal, 1859 and *Triatoma tibiamaculata* Pinto, 1926 showed fragmentation of the sex chromosome X, different from other species also grouped in Brasiliensis subcomplex. Thus, as the initial proposal of the grouping of species in the subcomplex was performed using basically morphological data and geographical distribution [5], the number of chromosomes showed to be an important tool cytotaxonomic and, therefore, was proposed the exclusion of the three species with fragmented sex chromosome X of Brasiliensis subcomplex [16].

Thus, we review all triatomine species with the number of chromosomes described in the literature. Through these data highlight the importance of further analysis cytogenetic with karyotype description in Triatominae subfamily, since it can help as an important tool cytotaxonomy and mainly allows the understanding of the evolution of this important group of insect vectors of Chagas disease.

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