

# Nucleolar Persistence during Meiosis of the Triatomines (Hemiptera, Triatominae) – An Editorial Review

Alevi KCC\* and Azeredo-Oliveira MTV

Laboratory of Cell Biology, Department of Biology, Institute of Biosciences, Humanities and the Exact Sciences, Sao Paulo State University – Júlio de Mesquita Filho (UNESP/IBILCE), São José do Rio Preto, São Paulo, Brazil

The triatomines are hematophagous insects of great importance to public health, since they are the main form of transmission of the protozoan *Trypanosoma cruzi*, etiologic agent of Chagas disease [1]. In addition to the epidemiological importance, these insects are important models for cellular studies because they present some peculiarities as holocentric chromosomes [2], meiosis inverted to the sex chromosomes [2] and persistence nucleolar during meiosis [3].

The nucleolar persistence phenomenon is characterized by the presence of the nucleolus or nucleolar corpuscles during all phases of meiosis [4], unlike other eukaryotes where the nucleolus is fragmented at the end of prophase and reorganized only in anaphase [5].

This phenomenon was initially described to *Panstrongylus megistus* and *P. herreri* [3]. Recently, nucleologenese of 23 triatomine species was analyzed and the nucleolar persistence was observed in all: *Triatoma infestans* [6], *T. klugi* [7], *T. lenti* [8], *T. melanocephala* [8], *T. i. melanosoma* [9], *T. platensis* [10], *T. protracta* [10], *T. tibiamaculata* [10], *T. vitticeps* [11], *T. vanda* [12], *T. williamsi* [12], *P. megistus* [6], *P. herreri* [6], *Rhodnius colobiensis* [4], *R. domesticus* [13], *R. montenegresis* [4], *R. nasutus* [4], *R. neglectus* [4], *R. neivai* [4], *R. pallescens* [6], *R. pictipes* [4], *R. prolixus* [4] and *R. robustus* [4].

Recently, we suggest that nucleolar material which persists during meiosis may exhibit transcriptional activity and to be associated with the formation of the body chromatoid [14] (cytoplasmic organelles indispensable for cell differentiation during spermiogenesis, since the nucleolus of the triatomines shows no transcriptional activity in this phase of spermatogenesis [15]).

Therefore, we emphasize the importance of nucleolar studies in Triatominae subfamily and we underscore the need for further studies with specimens of the other 15 genera of triatomines [16] to corroborate if the phenomenon of nucleolar persistence is a synapomorphy of Triatominae. Furthermore, we highlight the need for further studies to assess whether the material that persists is really active during meiosis.

## References

- Noireau F, Diosque P, Jansen AM (2009) *Trypanosoma cruzi*: adaptation to its vectors and its hosts. Vet Res. 40: 26.
- Ueshima N (1966) Cytotaxonomy of the triatominae (Reduviidae: Hemiptera). Chromosoma 18: 97-122.
- Tartarotti E, Azeredo-Oliveira MTV (1999) Patterns of nucleolar activity during spermatogenesis of two triatomines, *Panstrongylus megistus* and *P. herreri*. Caryologia 52: 177-184.
- Alevi KCC, Castro NFC, Lima ACC, Ravazi A, Morielle-Souza A, et al. (2014) Nucleolar persistence during spermatogenesis of the genus *Rhodnius* (Hemiptera, Triatominae). Cell Biol Intern. 38: 977-980.
- González-García JM, Rufas JS (1995) Nucleolar cycle and localization of NORs in early embryos of *Parascaris univalens*. Chromosoma 104: 287-97.
- Morielle-Souza A, Azeredo-Oliveira MTV (2007) Differential characterization of holocentric chromosomes in triatomines (Heteroptera, Triatominae) using different staining techniques and fluorescent in situ hybridization. Gen Mol Res. 6: 713-720.
- Costa LC, Azeredo-Oliveira MTV, Tartarotti E (2008) Spermatogenesis and nucleolar activity in *Triatoma klugi* (Triatominae, Heteroptera). Gen Mol Biol. 31: 438-444.
- Alevi KCC, Mendonça PP, Pereira NP, Rosa JA, Azeredo-Oliveira MTV (2013). Análise das possíveis Regiões Organizadoras Nucleolares e da atividade nucleolar em *Triatoma melanocephala* e *T. lenti*, importantes vetores da doença de Chagas. Ver Cien Farmac Básica e Aplicada 34: 417-421.
- Bardella VB, Azeredo-Oliveira MTV, Tartarotti E (2008) Cytogenetic analysis in the spermatogenesis of *Triatoma melanosoma* (Reduviidae; Heteroptera). Gen Mol Res. 7: 326-335.
- Campos SA, Azeredo-Oliveira MTV (2005) Cytogenetic study on three species of the genus *Triatoma* (Heteroptera: Reduviidae) with emphasis on nucleolar organizer regions. Caryologia 58: 293-299.
- Severi-Aguar GDC, Lourenço LB, Bicudo HEMC, Azeredo-Oliveira MTV (2006) Meiosis aspects and nucleolar activity in *Triatoma vitticeps* (Triatominae, Heteroptera). Genetica 126: 141-151.
- Pereira NP, Alevi KCC, Mendonça PP, Azeredo-Oliveira MTV (2015) Spermatogenesis and nucleolar behavior in *Triatoma vanda* and *Triatoma williamsi* (Hemiptera, Triatominae). Gen Mol Res., in press.
- Morielle A, Azeredo-Oliveira MT (2004) Description of the nucleolar activity and karyotype in germinative cell lines of *Rhodnius domesticus* (Triatominae, Heteroptera). Caryologia 57: 31-37.
- Borgueti AO, Alevi KCC, Silistino-Souza R, Rosa JA, Azeredo-Oliveira MTV (2015) Immunofluorescence and ultrastructural analysis of the chromatoid body during spermatogenesis of *Triatoma platensis* and *T. rubrovaria* (Hemiptera, Triatominae). Micron 74: 44-46.
- Alevi KCC, Mendonça PP, Pereira NP, Rosa JA, Azeredo-Oliveira MTV (2014) Is there post-meiotic transcriptional activity during hemipteran spermiogenesis? Invert Reprod Devel 58: 193-198.

\*Corresponding author: Kaio Cesar Chaboli Alevi, Instituto de Biociências, Letras e Ciências Exatas, IBILCE – UNESP, Rua Cristóvão Colombo, 2265 Jardim Nazareth 15054-000 – São José do Rio Preto, SP – Brasil, Tel: (17) 32212380 Ramal: 2378; E-mail: [kaiochaboli@hotmail.com](mailto:kaiochaboli@hotmail.com)

Received July 25, 2015; Accepted July 26, 2015; Published July 28, 2015

Citation: Alevi KCC, Azeredo-Oliveira MTV (2015) Nucleolar Persistence during Meiosis of the Triatomines (Hemiptera, Triatominae) – An Editorial Review. Entomol Ornithol Herpetol 4: e113. doi:10.4172/2161-0983.1000e113

Copyright: © 2015 Alevi KCC, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

16. Alevi KCC, Rosa JA, Azeredo-Oliveira MTV (2013) Mini Review: Karyotypic Survey in Triatominae Subfamily (Hemiptera, Heteroptera). Entomol Ornithol Herpetol 2: 106.