THE KARYOTYPE OF THE PARASITOID *Chelonus insularis* Cresson (HYMENOPTERA, BRACONIDAE, CHELONINAE)

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(With 1 figure)

ABSTRACT

The karyotype of *Chelonus insularis* (Hymenoptera, Braconidae, Cheloninae) is described. The males show an haploid number of seven chromosomes and the females a diploid number of fourteen chromosomes, confirming haplo-diploid sex determination. Comparisons of these results with karyotypes of other species of the same family were done and a possible mechanism involved in the karyotype evolution of this species is discussed.

Key words: cytogenetic, chromosome and sex determination.

RESUMO

Cariótipo do parasitóide *Chelonus insularis* Cresson (Hymenoptera: Braconidae: Cheloninae)

O cariótipo de *Chelonus insularis* (Hymenotera, Braconidae, Cheloninae) é descrito. Os machos apresentam um número haplóide de sete cromossomos e as fêmeas, um número diplóide de 14 cromossomos, confirmando o mecanismo haplodiplóide de determinação do sexo. Comparações entre esses resultados com cariótipos de outras espécies da mesma família foram feitas, e um possível mecanismo envolvido na evolução do cariótipo nesta espécie é discutido.

Palavras chave: citogenética, cromossomo e determinação do sexo.

INTRODUCTION

The subfamily Cheloninae comprises the internal parasitoids of Lepidoptera. The genus *Chelonus* is very large and includes many natural enemies of Lepidoptera which are considered pests of several crops. Jones (1985) observed numerous associations between the genus *Chelonus* and *Spodoptera*, like *C. inanitus*, a parasitoid of *S. littoralis*, *S. exigua* and *S. frugiperda*. Another example is *Chelonus insularis* which is an internal, arrhenotokous and solitary endoparasitoid insect, an important agent in the biological control of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera, Noctuidae), a pest that causes severe damages in corn fields in Brazil. Cruz *et al.* (1991) studied the potential parasitism as an agent of biological control of *S. frugiperda* and found that parasitism in laboratory conditions was very significant (86%).

Although the Braconidae is a large family and its members provide human benefits, there are several species that remain cytogenetically unknown, despite several cytogenetic studies have been done in this family. The present study aims at determining the karyotype of *Chelonus insularis.*

MATERIAL AND METHODS

This study was conducted using individuals from fall armyworm egg masses parasitized by mated females of *C. insularis* collected at maize

fields of the Centro Nacional de Pesquisa de Milho e Sorgo (CNPMS), Sete Lagoas, Minas Gerais State, South-eastearn Brazil.

Chromosome squashes were obtained from cerebral ganglia of larvae in prepupal phase using the Imai *et al*. (1988) technique that consists of taking off the cerebral ganglia of prepupa and keeping it in a hypotonic-colchicine solution for two and a half hours. The material is then fixed and, after 24 hours, stained with Giemsa. Such technique was originally developed for ants, but it works with bees and wasps as well (Hoshiba & Imai, 1993; Pompolo & Campos, 1995; Gomes *et al*., 1995).

About ten metaphases in each slide was observed in a sample of 23 males and 12 females. The karyotype was arranged by ordering the chromosomes in decreasing size.

RESULTS

Chelonus insularis has the haploid number of seven (male) and the diploid number of fourteen (female) chromosomes. The morphological constitution of the chromosomes is: 8(4) metacentric, 4(2) telocentric and 2(1) acrocentric (see Fig. 1, A and B).

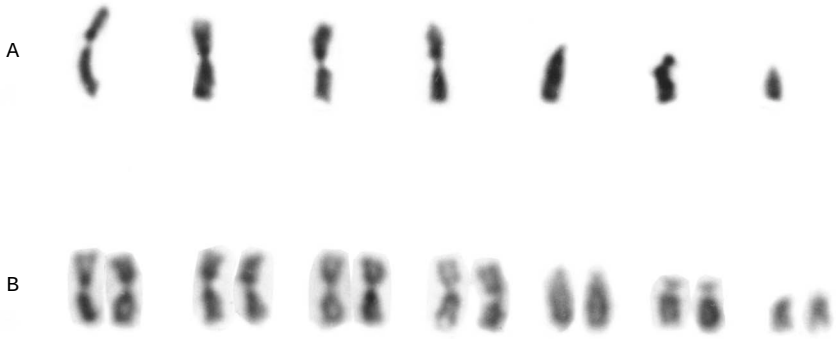

Fig. 1 — Karytotype of *Chelonus insularis*: (A) male (n = 7) and (B) female (2n = 14). Bar = 5 µm.

DISCUSSION

The Braconidae presents significant cytogenetic variation among its various taxa. Gokhman & Quicke (1995) pointed out that the variation in the haploid chromosome number ranges from 4 to 7 in the subfamilies Aphidiinae and Charmontinae and in the genus *Rhysipolis*, from 8 to 11 in the subfamilies Braconinae (*Habrobracon*), Meteorinae (*Meteorus*) and Miracinae (*Mirax*) and from 12 to 17 in the subfamilies Doricty nae (*Heterospilus*), Alysiinae and Microgastrinae.

The chromosome number found in *C. insularis* has already been observed in two other species: *Aphidius rhopalosiphi* and *Ephedrus* sp. (Gokhman & Quicke, 1995). Comparing the karyotype of *C. insularis* with *Meteorus versicolor* (showing n=8 inferred from the figure presented by Gokhman & Quicke, 1995), it could be noted that the difference in chromosome number is due to one additional pair of a very small acrocentric chromosome present in the *M. versicolor*.

A good correlation among all the other pairs, the four metacentrics and the two telocentrics, was observed. Based on these data, a mechanism promoting such difference could be a result of a fusion mechanism. In this case, taking into consideration the modal theory of karyotype evolution (Matthey, 1973), and the chromosome number presented by the species on the subfamilies Braconinae e Meteorinae, the haploid number of 10 could be considered as the chromosome number present in the ancestral of these two subfamilies. From this modal number, fusion mechanisms could have originated new karyotypes, like the ones of *C. insularis* (n = 7) e *M. versicolor* (n = 8).

Similar hypothesis like this will only be validated if new cytogenetics studies would be made mainly with species of the same family.

Cytogenetics studies in parasitic wasps have increased in the last years and their importance to the karyotype evolution studies and taxonomic and phylogenetic approaches has been demonstrated. Further analysis should be done in more species in order to have a broader picture of the patterns involved in the evolution of the karyotype in this interesting group.

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