Karyotypes of three Psocoptera (Insecta) species from Madeira Island, Portugal

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Abstract. The male karyotype and testis structure of Atlantopsocus adustus (Hagen, 1865), Trichopsocus clarus (Banks, 1908) and Trichopsocus brincki Badonnel, 1963 from Madeira have been studied for the first time. All species display 2n = 17 (16A + X). In prophase cells of A. adustus and T. brincki a single nucleolus attached to one of the autosomal bivalents has been revealed. A. adustus has testes with three seminal follicles each, while the testes of T. clarus and T. brincki consist of one seminal follicle. The data on the two last species represent the first karyological data for the family Trichopsocidae.

Key words: Psocoptera, Madeira Island, karyotype, testes, endemic species.

INTRODUCTION

The fauna of Madeira comprises 40 Psocoptera species, including 6 endemics (Lienhard, 1998). We have studied for the first time the karyotypes and number of seminal follicles in Atlantopsocus adustus (Hagen, 1865) (fam. Psocidae), a Macaronesian endemic distributed in Madeira, the Azores and Canary Islands, and in two representatives of the family Trichopsocidae: Trichopsocus clarus (Banks, 1908), which has a worldwide distribution and is widespread in coastal regions, and T. brincki Badonnel, 1963, endemic to Madeira (Lienhard, Smithers, 2002). The data on the last two species represent the first karyological data for the family Trichopsocidae.

MATERIAL AND METHODS

The following material, collected by E. Nunes, has been used for analysis:


Specimens were fixed in alcohol/acetic acid mixture (3 parts of 96% ethanol: 1 part of glacial acetic acid) and kept in refrigerator at +4°C. Testes were dissected out of the abdomens and squashed on slides in a drop of 45% acetic acid. The preparations were made permanent by a dry ice technique (Conger, Fairchild, 1953). After the cover slips were removed, slides were dehydrated in fresh 3:1, air-dried and stained by Feulgen-Giemsa procedure as described previously (Golub,
RESULTS

Karyotype

Meiotic metaphases I (MI) of *A. adustus* (Fig. 1) and *T. brincki* (Fig. 2) include eight autosomal bivalents and a univalent X-chromosome. In both species the autosomal bivalents gradually decrease in size, while X-chromosome is close in size to a half of one of the middle-sized bivalents, and in the majority of cells is situated on one side of the bivalents, at the periphery of the metaphase plate.

In *T. clarus*, only meiotic anaphases I (AI) were available for analysis, and chromosomal plates with 8 and 9 univalents, respectively, have been observed (Fig. 3).

Thus, for every species, the formula of male diploid karyotype has been determined as $2n = 17 \ (16A + X)$.

After AgNO$_3$-staining, a single nucleolus at-
tached to one of the autosomal bivalents was revealed in every prophase cell of A. adustus and T. brincki (Figs 4, 5).

Reproductive system

A. adustus is characterised by testes each with three relatively small seminal follicles arranged consecutively at the vas deferens. Both T. clarus and T. brincki display testes each with one relatively large seminal follicle.

Discussion

All three studied species belong to the most advanced pscopteran suborder Psocomorpha and share karyotype with 2n = 17 (16A + X) in males. The variability of psocomorphan karyotypes has been observed recently (Golub, 2004). The great bulk of karyologically studied species of the suborder (about 85 %) has the same chromosome number, 2n = 17, which is considered as a modal and ancestral for Psocomorpha.

The pattern of nucleolus attachment has been so far studied in four psocid species (Golub et al., 2004; Golub, Cucerova, 2008, in press). A single nucleolus is revealed in meiotic prophas es in every species. However the location of NOR varies: in Psococerastis gibbosa (Sulzer, 1776) (Psocidae) and Dorypteryx domestica (Smithers, 1958) (Psyllopsocidae) the nucleolus is attached to one of the autosomal bivalents, which is coincident with data on A. adustus (Psocidae) and T. brincki (Trichopsocidae) from the present study. On the other hand, in Amphipsocus japonicus (Enderlein, 1906) (Amphipsocidae) and Blasta conspurcata (Rambur, 1842) (Psocidae) attachment of the nucleolus to the sex chromosomes is characteristic.

The studied species differ in the number of seminal follicles per testis – three in A. adustus and one in T. clarus and T. brincki. Both numbers have been reported for Psocomorpha, while 3 is the prevailing one (Wong, Thornton, 1968; Golub, 2003). A. adustus is the first representative of the genus Atlantopsocus studied in this respect. The species belongs to the largest pscopteran family Psocidae. All studied representatives of this family possess testes with 3 follicles (for a review see Golub, 2003).

T. clarus and T. brincki display a similar testis structure to Trichopsocus dalii (McLachlan, 1867), the only previously studied species of the family Trichopsocidae (Ribaga, 1901).

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References


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