CONTINUOUS OCCURRENCE OF INTRA-INDIVIDUAL CHROMOSOME REARRANGEMENTS IN THE PEACH POTATO APHID *Myzus persicae*

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Aphids (Hemiptera: Aphididae) are ancient insects that have conquered most of the world's biomes, including the tropics and subarctic regions. Aphids reproduce primarily by apomictic parthenogenesis, a form of reproduction whereby adult females give birth to female progeny in the absence of male fertilization and it has been frequently suggested that no genetic recombination occurs in such parthenogenetic generations so that it has been assumed that the offspring represent a sort of genetically identical clone.

The chromosome number and the structure of the karyotypes of aphids are generally stable within genera, although karyotype variations are relatively common within some species and have been associated to host plant specialization. As a general rule, aphids show more variations in the karyotype than other organisms since they have holocentric chromosomes with kinetic activity spread along the whole chromosome axis. Hence, chromosomal fragments can contact the microtubules and move properly in the daughter cells during cell division. In contrast, fragments of monocentric chromosomes may be lost during mitosis and meiosis in the absence of centromeric activity in the chromosome fragment.

Analysis of the holocentric mitotic chromosomes of the peach-potato aphid *Myzus persicae* (Sulzer), from 4 different clones, revealed diverse chromosome numbers, ranging from 12 to 17, even within each embryo, in contrast to the standard karyotype of this species (2n=12). Chromosome length measurements, combined with fluorescent *in situ* hybridization experiments, showed that the observed chromosomal mosaicisms are due to recurrent fragmentations of autosomes 1 and 3. Contrary to what generally reported in literature, X chromosomes were also frequently involved in recurrent fragmentations, in particular at their telomeric ends opposite to the nucleolar organizer bearing telomere. The four aphid clones showed recurrent fissions of the same chromosomes in the same regions, thereby suggesting that the *M. persicae* genome has a sort of fragile sites that are at the basis of the observed changes in chromosome number.

Experiments to induce males also revealed that the *M. persicae* clones are obligately parthenogenetic, arguing that the reproduction by apomictic parthenogenesis, together with a high telomerase expression that stabilized the chromosomes involved in the observed fragmentations, favoured the stabilization and inheritance of the observed chromosomal fragments.