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FISH analysis and cytogenetic characterization of male meiotic prophase I in *Acricotopus lucidus* (Diptera, Chironomidae)

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ABSTRACT. In the chironomid *Acricotopus lucidus*, two cells with quite different chromosome complements arise from the last unequal spermatogonial mitosis, as a consequence of monopolar migration of the so-called germ line limited chromosomes (Ks). The cell receiving all the Ks, in addition to two sets of the regularly segregating somatic chromosomes (Ss), develops into the primary spermatocyte, while the cell getting only Ss differentiates into an aberrant spermatocyte. Only the primary spermatocyte enters meiosis. These nuclear events in the primary spermatocytes of *A. lucidus* during prophase I were analyzed by carmine-orcein staining, silver impregnation, live-cell RNA fluorescence labeling, and fluorescence *in situ* hybridization, using painting probes of the three Ss and the K centromeres. Early prophase I nuclei display large condensed chromatin blocks showing intense carmine staining, dark silver nitrate impregnation and bright DAPI fluorescence. The first clear signs of meiotic prophase progression are loops arising at early pachytene, which originate from the gradually decondensing chromatin blocks. The blocks presumably represent facultative heterochromatin. Chromosome painting demonstrates that the pachytene loops are composed of the two closely paired homologues. Conspicuous telomere attachments of differently painted non-homologous chromosomes were detected. The centromeres of the Ks group together, indicating a classical bouquet arrangement of the paired homologues in pachytene. The clustered centromeres may function as pairing centers to initiate synapsis of the homologues. Nucleolus expression data support the idea that the aberrant spermatocyte nourishes the primary

spermatocyte via a connecting cytoplasmic canal.

Key words: Chromosome painting; Germ line limited chromosomes; Heterochromatin; Meiosis; Prophase I; Spermatogenesis

