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ABSTRACTS

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KARIOTYPE MORPHOLOGY AND STRUCTURE IN SPECIES *LIBELLULA FULVA* MULL. (ODONATA, LIBELLULIDAE)

Micro-chromosomes (m-chromosomes) represent an important feature of karyotype of the majority of dragonfly species. Their number and size vary among different species, subspecies, geographical populations, within individuals of the same species and even among cells of the same stage in the same individual. As a continuation of cytogenetic research of the odonate genus *Libellula* in this work, besides chromosome numbers, the variability of m-chromosome number and size during spermatogenesis were investigated in a species *Libellula fulva*.

The diploid chromosome number, determined in spermatogonial metaphases is $2n=25$ ($22a+X+2m$). Chromosome number $2n=27$ ($22a+X+4m$) was also found in a small percentage of cells. The haploid chromosome number found in metaphases I and II is $n=13$ ($11a+X+m$), whereas the type of sex determination is XO/XX (males are heterogametic sex). In a small number of meiotic cells a haploid chromosome number $n=14$ ($11a+X+2m$) was also found.

The relative size of m-chromosomes was expressed as a ratio between surface areas of X and m-chromosomes (X:m). During spermatogenesis the X:m ratio varies from 1.1 to 1.7, with a mean value of 1.4. According to distribution of Gauss the mean value is 1.3. After measurements of areas of m-chromosomes in cells with chromosome numbers $2n=27$ and $n=14$ it was established that each m-chromosome is twofold smaller than m-chromosomes in cells with chromosome numbers $2n=25$ and $n=13$ respectively. The reason for an increase of m-chromosome number in such cells is most probably their precocious segregation, which is well documented in *Libellula depressa*.

On the basis of obtained results it is concluded that the variability of size of m-chromosomes in males of *Libellula fulva* is caused by: a) different degrees of m-chromosome condensation during spermatogenesis and b) true differences in size of m-chromosomes as a consequence of quantitatively different fragmentations of normal autosomes.

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MORFOLOGIJA I STRUKTURA KARIOTIPA VRSTE *LIBELLULA FULVA* MULL. (ODONATA, LIBELLULIDAE)

Mikro-kromosomi (m-kromosomi) su značajno obilježje kariotipa gotovo svih vrsta reda Odonata, a njihov broj i veličina variraju među različitim vrstama, podvrstama, geografskim populacijama, jedinkama pa čak i u stanicama iste jedinke. U okviru daljnjih citogenetičkih istraživanja roda *Libellula* u ovom su radu kod mužjaka vrste *Libellula fulva*, osim broja kromosoma, istraženi broj i varijabilnost veličine m-kromosoma tijekom spermatogeneze.

Analizom spermatogonijalnih metafaza utvrđen je diploidan broj kromosoma $2n=25$ ($22a+X+2m$). U manjem broju stanica nađen je broj $2n=27$ ($22a+X+4m$). U metafazi I i II je utvrđen haploidan broj kromosoma $n=13$ ($11a+X+m$) i XO/XX tip determinacije spola (mužjaci su heterogametan spol). U manjem broju mejojskih stanica nađen je haploidan broj $n=14$ ($11a+X+2m$).

Relativna veličina m-kromosoma izražena je kao omjer površina X i m-kromosoma (X:m). Tijekom spermatogeneze, omjer X:m varira u rasponu od 1.1 do 1.7, s prosječnom vrijednošću od 1.4. Prema Gauss-ovoj raspodjeli ta vrijednost iznosi 1.3. Mjerenjem površine m-kromosoma u stanicama s brojem kromosoma $2n=27$ i $n=14$ ustanovljeno je da je svaki od m-kromosoma dvostruko manji od m-kromosoma u stanicama s brojem kromosoma $2n=25$ i $n=13$. Uzrok povećanja broja m-kromosoma u nekim stanicama mužjaka vrste *Libellula fulva* je najvjerojatnije njihova preuranjena segregacija, koja je inače poznata kod vrste *Libellula depressa*.

Na osnovu rezultata ovog rada zaključeno je da kod mužjaka vrste *Libellula fulva* do variranja veličine m-kromosoma dolazi zbog: a) različitog stupnja kondenzacije m-kromosoma tijekom spermatogeneze i b) stvarnih razlika u veličini m-kromosoma kao posljedice fragmentacija autosoma na različitim mjestima.