

Type of presentation: Oral

S4-O-1505 Total disturbance in chromosome synapsis and DSB repair do not arrest meiosis in triploid hybrid males of rock lizards

Spangenberg V. E.¹, Arakelyan M. S.², Galoyan E. A.³, Danielyan F. D.², Kolomiets O. L.¹¹Vavilov Institute of General Genetics, Russian Academy of Sciences, ²Department of Zoology, Yerevan State University,³Zoological Museum, Lomonosov Moscow State University

vspangenberg@gmail.com

Defects in synapsis and DSB repair, disturbance of nuclear architectonics during meiotic prophase I leads to checkpoint-dependent arrest of meiosis described in many organisms. Here we describe spermatogenesis in allotriploid hybrid reptiles with multiple disturbances during prophase I.

Triploids of a hybrid origin are not infrequent in reptiles. However, they have reproductive problems due to the limitations imposed by meiosis. Hybrid animals of different ploidy can be found in hybrid zones of rock lizards of genus *Darevskia*: triploids and even tetraploids. Triploid hybrids have been found at a high frequency in the hybrid zones.

We studied immunostained preparation of prophase I nuclei and electron microscopy of spermatids in natural triploid hybrids males resulting from parthenogenetic *D. unisexualis* [$2n=38$ (36A+wZ)] and the males of parental species *D. valentini* [$2n=38$ (36A+ZZ)] and *D. raddei nairensis* [$2n=38$ (36A+ZZ)]. Three chromosome sets were found to occur in cell nuclei in the *D. unisexualis* × *D. valentini* [$3n=57$ (54A+wZZ)] hybrids, two originating from a parthenogenetic *D. unisexualis* female and one from the *D. valentini* male (Fig. 1A).

Here we demonstrate distorted chromosome synapsis and incomplete double-strand breaks (DSB) repair in meiotic prophase I of triploid hybrid males (Fig. 1 B,C). The competitive synapsis of three chromosome sets was studied in 329 cells and not a single spermatocyte I nucleus with complete chromosome synapsis was detected. We detected the evidence of crossing over in trivalents of homeologous chromosomes in *D. unisexualis* × *D. valentini* males (Fig. 1C, 2B). The number of mismatch repair foci (MLH1 foci) in the triploid hybrid was enough to pass through both meiotic divisions.

Surprising finding of numerous abnormal mature spermatids in the testes of the studied hybrid was made (Fig. 2 D-E). Thus we suppose that there is no strong selection against spermatocytes with incomplete synapsis, incomplete DSB repair or distorted chromosome desynapsis during prophase I in triploid hybrid males under study. Such abnormalities in mammals as a rule lead to arrest at prophase I stage.

The reported study was funded by RFBR according to the research project № 17-00-00430 (17-00-00429).

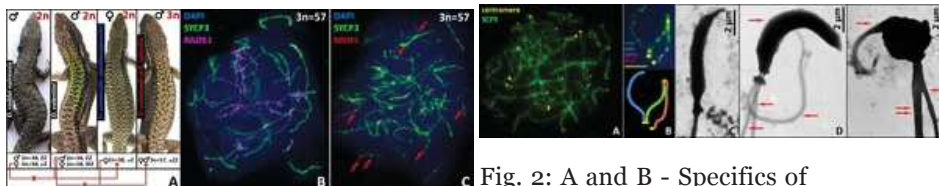


Fig. 1: A - Hybridization scheme of natural triploid hybrids *Darevskia unisexualis* × *Darevskia valentini*. B, C - Spread spermatocyte I nuclei of a triploid *D. unisexualis* × *D. valentini* hybrid ($3n = 57$) immunostained with antibodies against the SYCP3, RAD51 and MLH1 proteins.

Fig. 2: A and B - Specifics of competitive synapsis of homeologous chromosomes. C-E - Electron microscopy of spermatids, silver nitrate staining: C - *D. valentini*; D and E - *D. unisexualis* × *D. valentini*. Spermatid abnormalities (D, E): two or three flagella, and an enlarged or deformed head. The abnormalities are indicated with arrows.