

SPERM TRAINS AND MATING BEHAVIOUR IN WOOD MICE OF THE GENUS *APODEMUS*

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There is evidence of possible correlation between mating behaviour, sperm morphology and sperm behaviour in the female reproductive tract prior to fertilization. As shown in *A. sylvaticus* (1), cooperation between spermatozoa of an individual confers a significant advantage for fertilization, where inter-male sperm competition is intense. In our study we aimed to focus on three other species of rodent genus *Apodemus*; *A. flavicollis*, *microps*, *agrarius* versus *A. sylvaticus*, whose either promiscuous or monogamous mating behaviour has already been demonstrated (Stopka *et al.*, unpublished). We placed spermatozoa from cauda epididymis of adult males of selected species into mouse *in vitro* fertilisation medium, and compared sperm behaviour of individual species. Surprisingly, despite monogamous or polygamous mating behaviour, sperm of all the above species rapidly aggregated into motile trains, as in *A. sylvaticus*, consisting of hundreds of cells. However, size and cell–cell coupling differed between each species. This may point to another aspect besides mating behaviour that may be involved in building up a mechanism for successful sperm delivery to the egg. These unique and organised aggregations can significantly increase sperm progressive motility. A detailed study of the main cytoskeletal proteins, using immunofluorescent methods, together with confocal microscopy, shows that in sperm-sperm binding especially protein actin plays an important role. According to *in vitro* experiments, we speculate that the viscous environment of the female reproductive tract may have played a crucial role in the evolution of sperm behaviour. Disintegration of motile sperm trains was associated with the majority of spermatozoa undergoing a premature acrosome reaction. However, the mechanism that triggers it remains to be determined. To conclude, it is likely that a myriad of changes in social behaviour of particular species were not accompanied by changes in sperm behaviour, but instead they retained original ancestral tactics typical for the genus *Apodemus*.

(1) Moore, H., Dvorakova, K., Jenkins, N., Breed, W. (2002) Exceptional sperm cooperation in the wood mouse. *Nature* **418**, 174–177.