

STSM Scientific Report

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STSM Applicant: M.Sc. Galina Prokopchuk, Faculty of Fisheries and Protection of Waters, University of South Bohemia in Ceske Budejovice, 389 25 Vodnany (CZ), prokopchuk@frov.jcu.cz

STSM Topic: Elaboration of a method for detail description the mechanics of wave initiation and propagation in fish sperm flagella

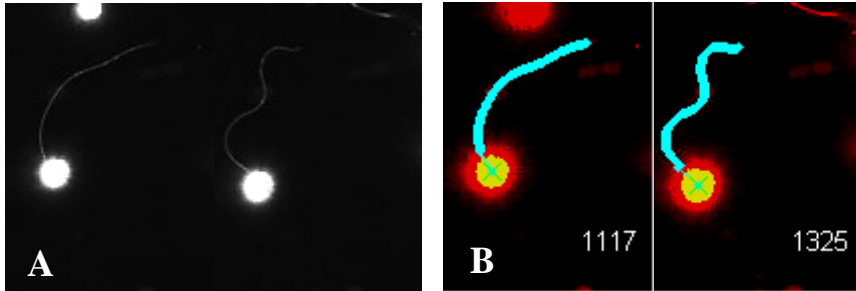
Purpose of the STSM:

- Improving our understanding of basic mechanical processes in flagella that generate the movement initiation and further propagation of fish spermatozoa.
- Provide a negotiating platform to support collaborative work between the Laboratory Reproductive Physiology, Research Institute of Fish Culture and Hydrobiology, South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses, Faculty of Fisheries and Protection of Waters (FFPW), University of South Bohemia in Ceske Budejovice, Vodnany, Czech Republic and The Centre for Mathematical Biology within The Mathematical Institute of The University of Oxford, Oxford, United Kingdom.

Description of the work done and the main results:

First part of my staying in the Mathematical Institute of The University of Oxford was devoted to exploring the basics of Matlab software environment. Parallel to this, we have started to analyze the flagellar beat patterns of fish spermatozoa from video records obtained by high-speed camera. For first series of assay we selected high quality movies showing flagella behavior of carp spermatozoa at activation step of motility. Refining the Matlab algorithm of flagellar extraction, which was previously developed for human spermatozoa by colleagues from the Mathematical Institute, for current model of flagella behavior we performed autodetection of carp sperm flagella for further extraction of waveform parameters.

Preliminary results: Fig. A. Frames of wave pattern observed during motility activation of a carp spermatozoon in DW plus 10% DMSO by high-speed video microscopy (dark-field, 50× lens, 1000 fps). Fig. B. The same frames obtained after applying of flagellar extraction algorithms in Matlab.



Future collaboration with host institution:

This stay intensified the research cooperation between our Institutes and contributed to the future plans to continue the work started. Intersection of our research interests in spermatozoa behaviour and interpretation of the findings, both biologically and mechanically, will result in valuable outcomes for scientific publications.

Confirmation by the host institution:

Dr. Eamonn A Gaffney hereby confirms that Ms. Galina Prokopchuk stayed in The Centre for Mathematical Biology within The Mathematical Institute of The University of Oxford as an academic visitor from October 12th to November 12th 2013.



Signed: Dr. Eamonn A Gaffney



Signed: Galina Prokopchuk, M.Sc.