日本動物学会北海道支部 第549回 支部講演会

日時：平成 25 年 11 月 29 日（金）： 17:30～19:00

場所：旭川医科大学総合研究棟　1階 小講堂

講演者: 広橋教貴 准教授（島根大学・隠岐臨海実験所）

演題: Molecular and evolutionary mechanisms of CO_2 sensing by spermatozoa
「精子における CO_2 感受性の分子機構とその進化的意義」

講演要旨: Postcopulatory sexual selection can favor the evolution of sperm traits being adapted to social and ecological environments. Loliginid squids produce two types of different fertilization-competent spermatozoa within a species. Large “consort” males produce small sperm, whereas small “sneaker” males produce large sperm[1]. Only sneaker sperm exhibit a clustering (swarming) behavior when ejaculated into seawater[2]. This sperm cluster is mediated by chemotaxis, i.e., sperm-emitted respiratory CO_2 and a flagellar membrane-anchored carbonic anhydrase serve as a chemoattractant and its receptor, respectively. Downstream signaling of the CO_2/acid sensing in the squid spermatozoa are similar to those proposed in mammalian taste neurons regarding a proton current and off-response (recovery from acidosis). The strategy for directed movements toward CO_2 closely resembles to what sea urchin sperm do for an egg peptide; spatiotemporal coordination of straight and turn swimmings in a chemical gradient.

Unlike other marine species, squid spermatozoa can utilize external hexoses such as glucose (glycolysis) to refuel energy for flagellar motility like in mammalian species. Oxidative phospholylation dose or does not require for sustained motility in consort or sneaker spermatozoa, respectively. Consequently, sneaker, but not consort, spermatozoa efflux large amount of D-lactate into the microenvironment where the sperm cluster has formed. When the sperm cluster was placed in a glucose gradient, the cluster initiated collective migration to the souse of glucose. Because single sperm cells do not exhibit chemotaxis to glucose, a lactate gradient within the sperm cluster would generate an intrinsic force that enable to move *en masse* to nutrition source, possibly at female’s seminal receptacles or oocytes[3]. These results suggest that sneaker sperm are adapted to insemination environments by coordinating their respiratory and metabolic pathways.

References

[1] Y. Iwata et al., BMC Evol. Biol. **11**, 236 (2011)
[2] N. Hirohashi et al, Curr. Biol. **23**, 775 (2013)
[3] N Hirohashi & Y Iwata, Commun. Integr. Biol. In press (2013)

連絡先：春見達郎（旭川医科大学解剖学講座）
E-mail：harumi@asahikawa-med.ac.jp