Rodents of Unusual Sperm

Julie Simons[1], Paul Cripe[2], Owen Richfield[2]

[1]The California Maritime Academy, [2]Tulane University

Cooperative swimming behavior in sperm is a phenomenon observed in many species of rodents and marsupials. These behaviors involve swimming in pairs or groups, often with a mechanical link between individuals. In particular, some species of opossum have sperm often swim cooperatively as a pair, with heads fused together. While this behavior has been well-documented, it is unknown how it contributes to fertilization potential. In some experimental work, it has been shown that groups swim faster than individuals. On the other hand, a significant portion of the sperm engaged in collective swimming are rendered unable to fertilize the oocyte because of damage caused by the collective swimming itself. In this talk, we will introduce an undergraduate research project investigating the potential advantages to cooperative swimming behavior in low Reynolds number (viscous) fluid flow. We will highlight our mathematical and computational methodology, as well as how to engage undergraduates with minimal computational or physics background. Interestingly, our results indicate there are fluid mechanical advantages for cooperative swimming behaviors that coincide with similar geometries observed in biological studies. We postulate these results may provide evidence for an evolutionary advantage to cooperative swimming in sperm.