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### EDITORS' CHOICE

Reproductive Biology

## Crowding Impairs Sperm Motility

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After *Caenorhabditis elegans* hermaphrodites mate with males, F-class prostaglandins produced by oocytes guide sperm to the spermatheca, where fertilization occurs. McKnight *et al.* found that wild-type sperm failed to efficiently target the spermatheca in *C. elegans* adults that lacked the transforming growth factor  $\beta$  (TGF- $\beta$ ) family member DAF-7 or its downstream signaling components. Expression of a *daf-7* transgene specifically in the ciliated ASI sensory neurons rescued sperm targeting in *daf-7* mutants. When population density is high, ascaroside pheromones accumulate in the environment and reduce *daf-7* expression in ASI neurons. Application of synthetic ascarosides caused sperm targeting defects that depended upon DAF-7 and its downstream effector DAF-3. Sperm targeting defects were also observed in mutants lacking cilia on the ASI neurons and in animals in crowded conditions. Experiments with genetic mosaics indicated that the DAF-7 receptors DAF-1 and DAF-4 were required in the germline for proper sperm targeting, implying that DAF-7 produced by the ASI neurons activated signaling in the germline to affect sperm migration. Oocyte-produced prostaglandins are required for proper directionality and velocity of sperm migration, and production of the F-class prostaglandins PGF1 $\alpha$  and PGF2 $\alpha$  was reduced in animals lacking DAF-1. Thus, when conditions are favorable for nematode reproduction, DAF-7 produced by the ASI neurons stimulates oocytes to produce the F-class prostaglandins that guide sperm to their target. Under crowded conditions, activation of these pheromone-sensitive neurons reduces the production of DAF-7, thereby hampering sperm migration until pheromone concentrations drop, indicating more favorable conditions for reproduction.

K. McKnight, H. D. Hoang, J. K. Prasain, N. Brown, J. Vibbert, K. A. Hollister, R. Moore, J. R. Ragains, J. Reese, M. A. Miller, Neurosensory perception of environmental cues modulates sperm motility critical for fertilization. *Science* **344**, 754-757 (2014). [\[Abstract\]](#) [\[Full Text\]](#)

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