A head for sex

Rozen, D.E.

© 2015. Published by The Company of Biologists Ltd | Journal of Experimental Biology (2015) 218, 2984-2986

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We all have different ideas of the meaning of trauma. For example, I'm untroubled by spiders, while my daughter shrieks at the mere thought of them. But what about a syringe full of sperm shot into your head? Traumatic enough for me and I'd assume for most people. However, as shown by Steven Ramm and colleagues in a recent issue of *Proceedings of the Royal Society*, one organism's trauma may be another's only shot at family life.

Macrostomum hystrix is a tiny flatworm with a positively bizarre sex life. In contrast to humans with two separate sexes, these worms are simultaneous hermaphrodites, meaning that they are both male and female at the same time. As a consequence, while it takes two humans to tangle, these worms can go it alone and self-fertilize. Although this, in itself, is not unusual, where it gets strange is the manner in which self-fertilization occurs. What Ramm and his colleagues discovered is that *M. hystrix* worms accomplish this trick by injecting sperm from their needle-like penises into their own heads! And the more sperm they inject, the more offspring they produce. Why the head? Simple: because of anatomical constraints, that's the easiest spot to reach.

Unsurprisingly, hypodermic self-fertilization – also known as traumatic insemination – is not the best reproductive choice for these worms. In previous studies, the team found that offspring produced by selfing

survived less well and were less fecund than offspring produced by outcrossing. So given these costs, why do they bother? In short, because they must.

Selfing solves a crucial problem for *M. hystrix* by assuring reproduction when opportunities to outcross are limited. Most plants can get by on this approach, as do a sizable fraction of animals, so why not? For a start, selfing animals entirely dispense with the risks and hassle of finding a mate. Additionally, their offspring are 100% their own. But selfing incurs serious costs, in particular the risk of inbreeding depression in offspring. Because of this cost, worms are quite reluctant to self-fertilize, waiting more than 50% longer than when they are given the chance to outcross. But a worm's life is short; when the team separated them from their potential mating partners, they went straight for their own heads.

Although peculiar, and even a little amusing, the behaviour of these worms makes perfect sense. Some reproduction is clearly better than the trauma of none, but what remains unclear is the cost to the worms themselves: you can imagine that traumatic self-insemination may do a worm about as much good as a hole in the head. Also, do they live shorter lives than outcrossed worms? And can they continue feeding as efficiently? The answers to these questions remain unsolved, so there is still much to learn about these interesting little creatures.

10.1242/jeb.112599

Ramm, S. J., Poirier, M. and Scharer, L. (2015). Hypodermic self-insemination as a reproductive insurance strategy. *Proc. R. Soc. B.* **282**, 20150660.

Daniel E. Rozen
University of Leiden
d.e.rozen@biology.leidenuniv.nl