

THE CUTTING EDGE

Gut Feelings

One of the legends of St. Valentine says that he was a priest arrested by Roman Emperor Claudius II for secretly performing marriages. Claudius wanted to enlarge his army and believed that married men did not make good soldiers, rather like Halsted's feelings about surgical residents. But Valentine's Day is about love, and if you remember a romantic gut feeling when you met your significant other, it might have a physiological basis.

It has long been known that *Drosophila* raised on starch media are more likely to mate with other starch-raised flies, whereas those fed maltose have similar preferences. In a study published online in the November issue of the Proceedings of the National Academy of Sciences, investigators explored the mechanism for this preference by treating flies with antibiotics to sterilize the gut and saw the preferences disappear (Proc. Natl. Acad. Sci. U.S.A. 2010 Nov. 1 [doi 10.1073/pnas.1009906107]). In cultures of untreated flies, the bacterium

L. plantarum was more common in those on starch, and sure enough, when *L. plantarum* was returned to the sterile groups, the mating preference returned. The best explanation for this is revealed in the significant differences in their sex pheromones. These experiments also support the hologenome theory of evolution wherein the unit of natural selection is the "holobiont," or combination of organism and its microorganisms, that determines mating preferences.

Mating gets more interesting when you have an organism that can choose between sexual and asexual reproduction, like the rotifer. Biologists say that it's more advantageous for a rotifer to remain asexual and pass 100% of its genetic information to the next generation. But if the environment changes, rotifers must adapt quickly in order to survive and reproduce with new gene

combinations that have an advantage over existing genotypes. So in this new situation, the stressed rotifers, all of which are female, begin sending messages to each other to produce males for the switch to sexual reproduction (Nature 2010 Oct. 13 [doi 10.1038/nature09449]). You can draw your own inference about males not being needed until there's trouble in the environment.

As far as humans are concerned, you may think you know all about sexual signals, but you'd be surprised by new findings. It's been known since the 1990s that heterosexual women living

together synchronize their menstrual cycles because of pheromones, but when a study of lesbians showed that they do not synchronize, the researchers suspected that semen played a role. In fact, they found ingredients in semen that include mood enhancers like estrone, cor-

tisol, prolactin, oxytocin, and serotonin; a sleep enhancer, melatonin; and of course, sperm, which makes up only 1%-5%. Delivering these compounds into the richly vascularized vagina also turns out to have major salutary effects for the recipient. Female college students having unprotected sex were significantly less depressed than were those whose partners used condoms (Arch. Sex. Behav. 2002;31:289-93). Their better moods were not just a feature of promiscuity, because women using condoms were just as depressed as those practicing total abstinence. The benefits of semen contact also were seen in fewer suicide attempts and better performance on cognition tests.

So there's a deeper bond between men and women than St. Valentine would have suspected, and now we know there's a better gift for that day than chocolates. ■



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