Jayne Jubb

ON THE BORDER

Info & insights from the interface between energy healing & science

October 2011

Welcome to the October 2011 edition of 'On the Border'.

For those of you new to 'On the Border', this is Jayne's monthly Ezine newsletter about the latest information and insights into energy fields, healing and science. Each month I share with you some of the latest research and how it applies to healing, energy work & (daily) life. There's a Fascinating Facts section and also a 'Freebie' where you get something for nothing, gratis.

What Rats Taught Neuroscientists About Love

Did you know that the dark mysteries of our love affairs have been illuminated by the love lives of rats, mice and monogamous prairie voles?

Neuroscientist Kelly Lambert's recent article is such an enjoyable romp (I mean, read) that I am reproducing it here in its entirety.

The Joys of Rat Sex

Rats have been studied intensely, enabling us to use them as a model to discern the influence of hormones, drugs, age and a host of other variables on sexual behavior. From decades of research, we know that rats follow a rather predictable sequence of events in the bedroom.

It goes something like this: The male rat greets the female rat by sniffing her. If the male seems distracted, the female may get his attention by darting around the cage and engaging in the ultimate rat flirtation response: ear wiggling. I still feel as if I am watching a cartoon when I see this behavior, the ears look like little helicopter propellers as the female entices the male to approach her. There is also a lot of sniffing. The female is sexually receptive, or in a behavioral state known as estrus, only 12 to 20 hours of her four- to five-day estrous cycle. It is only during this time, after ovulation, that the female will mate. In fact, if a male approaches when she is not in estrus, she is likely to give him a swift kick. Not having access to text messages, the males rely on their olfactory system to determine if the female is in the mood for love.

Only if the female is in estrus and has attracted the male's attention will the copulatory sequence begin. As the male mounts the female's back and grasps her

sides, she reciprocates by assuming a posture known as lordosis characterized by an arched back and lifted tail.

During a series of initial mounts, the male attempts to achieve penetration. If and when he does, that mount with accompanying penetration, lasting all of 200 milliseconds, is known as an intromission. Then the male mounts the female again. In an extended version of foreplay, this sequence will continue until the male has achieved from eight to 12 intromissions. On the last mount and penetration, the male finally ejaculates. To enhance the romantic ambiance, the male likes to sing during this process—he has a special ultrasonic vocalization announcing every phase of his sexual performance.

After this intense sequence—which lasts about 10 minutes—the male will take about a five-minute break and, yes, begin the entire ritual again. If left undisturbed, the two mice will repeat this reproductive dance five or more times. (I enjoy watching the sometimes sleepy male students in my animal behavior lectures suddenly wake up from their slumber as they hear about these rat sex studs.) As the males continue this marathon date, however, the time between the ejaculation and the next intromission, known as the postejaculatory interval, gets longer and longer, as if the male were getting tired over the course of the date night.

If a new female is placed in the cage, even when the male is displaying his "I'm exhausted" act, the rules suddenly change. With a new female in the area, an entirely new sequence begins, providing evidence that, for the rats, a little variety tends to spice things up.

Legend has it that this so-called Coolidge effect has a rather unique namesake. According to the story, President Calvin Coolidge was touring a chicken farm with his wife, Grace, during the 1924 reeletion campaign. When Mrs. Coolidge noticed the sexual vigor of a prize rooster, she asked the tour guide about the number of sexual encounters the rooster averaged in a day. After learning that the number was rather high—up to 20 encounters a day— she was visibly impressed and asked the guide to mention this interesting bit of information to the president. When President Coolidge heard this statistic, he asked if the encounters were with the same hen every time. The guide commented that, to the contrary, it was with a different hen every time. The president then asked the guide to convey that bit of information to Mrs. Coolidge.

When tested under the right conditions, we now know that females actually pace the timing of the males' mounts and intromissions. Even though the males prefer fast-paced intromissions and ejaculations, females require longer intervals to ensure fertilization and pregnancy. If males are tethered in a cage and the

copulation depends on the advances of the female, her optimal pacing schedule becomes apparent.

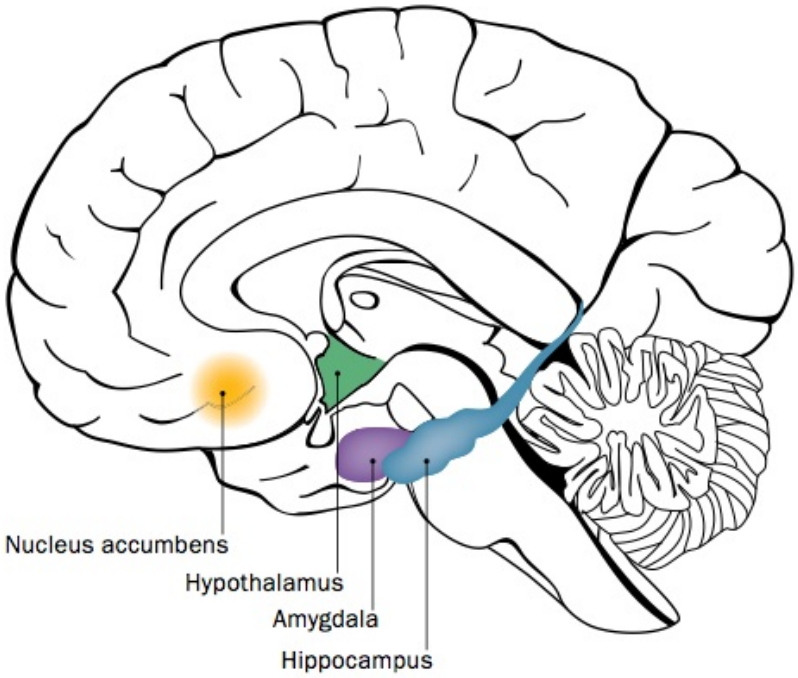
We can also use the rat sex model to learn about the potential disruptions or enhancements of certain drugs or environmental conditions on sexual responses. In a recent study, for example, a group of Italian neuroscientists wondered about the effects of rave parties on sexual behavior in humans. The researchers administered MDMA (Ecstasy) to rats and played very loud music for a specified period. They found that MDMA suppressed the sexual vigor of the male rats, but surprisingly the loud music mitigated the negative effects of the drug somewhat, though not to baseline levels. So the data from the rat raves suggest that such all-night parties have a negative impact on sexual responses.

All of this rat-sex reporting over the years has enlightened the medical community about the effects of different hormones on every aspect of the reproduction process. Fertility patients across the world have benefited from basic reproductive endocrinology work first contributed by rodents.

Hot Heads

Screenwriter Woody Allen has famously called the brain his “second favorite” organ. The truth is that the brain is just as essential to sexual behavior as the reproductive organs. The cadre of reproductive hormones— such as estrogen, testosterone, progesterone and prolactin—pulls the appropriate neural triggers for reproductive responses. In rodents, if the hormones are removed, the behavior is removed; thus, their sexual responses are considered hormone-dependent. These hormones exert their effects by entering the brain through its security system, the blood-brain barrier, and activating certain areas responsible for reproductive behaviors.

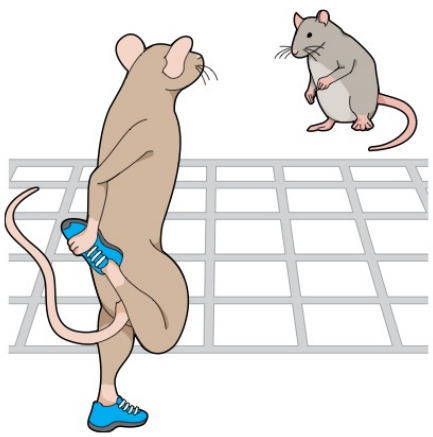
In the female, the focus has been on the small structure called the hypothalamus.



The brain (the human version, *at left*) is just as vital for sex as the reproductive organs. If what we know about rats is true of us, females need a hypothalamus to flirt. That organ also puts a female rat in the position required for a male to mount her. Rats (and people) feel pleasure through the nucleus accumbens, providing the motivation to engage in the act. The amygdala, an emotion hub, is the seat of desire. And sex may make you—or at least rats—smarter by spurring cell growth in the hippocampus, a memory center.

Generally this pinhead-size region is involved with motivational behaviors, such as eating, drinking, copulating, escaping and fighting. I frequently tell my students that this structure is responsible for the four F's: feeding, fleeing, fighting and…..mating. Within this structure are clusters of similarly functioning nerve cells. The so-called ventromedial hypothalamic nucleus is intimately involved with lordosis in the female rat. If this brain area is destroyed, the female will no longer display the posture required for the male to mount her. In addition, if the reproductive hormone progesterone is delivered to this area, it elicits flirting in the female—hopping, darting and ear wiggling. Along with other brain areas, the ventromedial hypothalamus also influences eating, informing us when we are full. Perhaps the female brain sees little difference between food and sex, explaining why chocolate is such a best seller on the supposedly most romantic day of the year, Valentine's Day.

The reward neurochemical for the brain, dopamine, and a hub of its reward circuit, the nucleus accumbens, are also involved in the copulatory response. If the nucleus accumbens is damaged, female rats reject males more often than when they have an intact reward circuit. An interesting study in the 1970s provided strong evidence of the intensity of the female's motivation for sexual encounters. Researchers found that female rats will run across an electrified grid to gain access to a male, a finding that runs contrary to beliefs that the female plays a passive role in copulation.



Another part of the hypothalamus, the medial preoptic area, contributes to sexual responses in male rats, as does the amygdala, which governs emotional processing. In an experiment that seemed to re-create Amsterdam's red-light district, University of Cambridge neuroscientist Barry Everitt and his colleagues trained male rats to press a bar for a sexually receptive female. After the males learned this task, the scientists damaged the medial preoptic area and placed the animals in the sex chamber. The brain-damaged rats continued to bar-press for females, suggesting they still wanted them, but once a female was delivered, the male rats failed to copulate with her. After the amygdala was damaged, the opposite occurred: these males did not bar-press for females—their desire was gone—but if a female was presented, they copulated with her. In this way, Everitt and his team dissociated sexual desire and sexual performance.

The brain's reward circuit is also involved in male sexual behavior. If researchers infused amphetamine—a drug that enhances dopamine—into the brain's pleasure center in male rats with amygdala lesions, the males resumed pressing a bar for females, indicating that the jolt from the reward center compensated for the lack of the amygdala function. Dopamine in the brain's pleasure center also increases naturally after a receptive female is placed behind a screen.

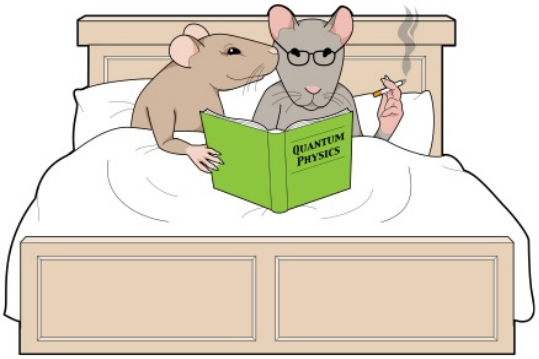
Smarter for Stamina?

Thus, it is clear that the brain initiates and enhances sexual behavior. A fascinating study conducted by Elizabeth Gould and her colleagues at Princeton University, including one of my former students, Erica R. Glasper, suggests that the converse is also true; that's right, sexual behavior enhances the brain. Gould is widely regarded for her work confirming that mammalian brains produce new neurons throughout the life span. This process, called neurogenesis, has been well documented in rats. Conditions associated with stress and high-stress hormones are typically linked to low levels of neurogenesis. Gould wondered if a behavior that could be described as both stressful and rewarding—namely, sex—would lead to increased neurogenesis.

To test her hypothesis, Gould exposed the Princeton male rats to either one receptive female (acute sexual experience) or 14 days of sexual experience (chronic sexual experience). The animals in both groups were injected with bromodeoxyuridine, a substance that is incorporated into DNA during cell division, leaving a physiological tag on recently generated brain cells; this technique is handy for discerning when new brain cells are born. The scientists also measured stress hormones and assessed anxiety behavior in the rats receiving sex therapy. They found that the brains of the rats given opportunities for sex showed a higher rate of neurogenesis in the hippocampus, a brain area involved in learning, memory and emotional processing.

Only the acute sexual experience was determined to be stressful for the animals. The chronic sex group no longer had high-stress hormones and exhibited decreased anxiety in a behavioral anxiety test. As an added benefit, when the researchers took a look at nerve cells in the chronic sex group, they found enhanced growth of connecting structures, or dendrites. Thus, even though sexual behavior is stressful, at least in the beginning, the rewarding aspects of the

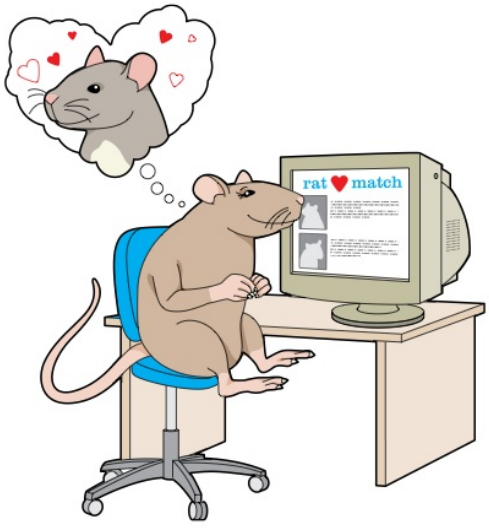
behavior appear to lead to both new nerve cells and more sophisticated connections among existing neurons in a brain area critical for learning and memory. This study suggests that sex builds more complex brains. There, I said it.



Ratmatch.com

I cannot confidently say that rats are not attracted to large muscles, dreamy eyes or a big bank account. I can only confirm that the scientific literature suggests that the rats use a more sophisticated compatibility screening technique. If a female rat could write a singles ad, it might read something like this:

Female rat from City Block 8 searching for healthy young male living at least seven blocks away who isn't afraid of letting the female pace the timing of romantic encounters. Coat color doesn't matter, but a diverse immune system does—a major histocompatibility complex that is very different from my own is essential to ensure the health of our offspring. I have my heart set on a family, but I don't expect the father to hang around. I know male rat brains aren't necessarily wired for the sophisticated social interactions required for parenthood. If interested, meet me in the local alley. I only have five hours left in this estrous cycle!



I realize that most people think very little screening occurs before rats consummate their relationships, but the truth is, at least for the females, romance is serious. For example, Gregory Glass, an infectious diseases expert at the Johns Hopkins School of Public Health, has been tracking the distance Baltimore city rats traverse to find their mates. His DNA testing suggests that jet-setting females are traveling a long distance—up to seven city blocks—when there are plenty of available males living in the female's local neighborhood. Why go so far? Researchers have yet to find the answers, but one possibility may be related to a little genetic screening. Female rats do this beautifully with their impressive olfactory system.

It appears that the proteins produced by a component of the genetic immunological blueprint have a distinct odor. This part of the immune system—the major histocompatibility complex (MHC)—is made up of a cluster of genes that encode proteins that provide information about the ability of the immune system to combat pathogens. The more diverse an animal's MHC, the better equipped it is to respond to the diverse array of immunological challenges it

meets over its lifetime. In simpler terms, there are a lot of different germs in an animal's environment; rats with a more diverse immunological tool kit have an advantage.

Accordingly, a female rat is more likely to select a mate whose MHC is different from her own so that her offspring will be well armed against immunological attack. Thus, the odors of the MHC-different males are indeed sexy for the females and likely lure them far from their homes. When female mice are allowed to choose their own mates in seminatural habitats, the MHCs of their offspring are more diverse than those of offspring that result from laboratory matings with assigned males. Thus, without the help of genetic counselors, the mice verified the immune profiles of their mates, leading to increased chances of survival for their offspring.

You may be thinking that there is no way humans are using this genetic screening strategy. But a series of "smelly T-shirt" studies suggests that human females prefer T-shirt odors from men who are less closely related to them and who have more dverse MHC profiles. And when researchers at the University of Oxford recently compared the MHCs of couples with randomly selected pairs of individuals, they found that the couples were more MHC-dissimilar than were the random pairs. This study tells us that human couples were indeed using MHC in their mate selection, even though this behavior certainly was not conscious.

The general health of an individual may also influence his or her desirability. One of my former students, Sabra L. Klein, an integrative biologist at Johns Hopkins, has done extensive research on just what rodents find sexy in potential mates. In an interesting study she conducted with Ohio State University neuroscientist Randy J. Nelson, these researchers manipulated the health status of males from two different vole species—one monogamous (voles in a committed type of relationship) and the other polygamous (voles that liked to play the field). They designed a kind of a bachelorette-style investigation in which a female of either species was given a choice between two males, one that was made sick with a bacterial endotoxin known as LPS and one that received a harmless saline injection. The scientists hypothesized that a monogamous female vole would pay closer attention to the health status of a male. After all, she was looking at a long future with this guy. Sure enough, monogamous female voles spent more time with the healthy, saline-injected male, whereas the male's health status did not influence the romantic choices of the polygamous voles.

A Prairie Vole Companion

In his radio show A Prairie Home Companion, Garrison Keillor brags that in the (fictitious) town of Lake Wobegon, "all the women are strong, all the men are good-looking and all the children are above average." In their communities, prairie voles distinguish themselves in another way: once two of them bond, the couple stays together for the rest of their lives; even after one dies, the partner rarely establishes a new pair bond. Talk about 'til death do us part!

University of Illinois at Urbana-Champaign neuroscientist C. Sue Carter has investigated the neurochemical basis of long-term pair bonds in prairie voles. In

one study, she and her colleagues administered two neuropeptides, oxytocin and vasopressin, to male and female voles. Known for its role in lactation and childbirth, oxytocin is also involved in positive social responses; vasopressin mediates physiological functions such as fluid retention as well as social responses. Carter and her colleagues found that these neuropeptides facilitated the formation of pair bonds in males and females. That is, if given a choice between a familiar partner and a strange animal, these neuropeptides led the prairie vole to spend more time with the familiar partner. When these neuropeptides were chemically blocked, no preferences for prior partners formed.

Larry J. Young's group at the Emory University School of Medicine has also tracked the pattern of oxytocin receptors in female voles. The team has identified rich populations of these receptors around the nucleus accumbens and the prefrontal cortex, an area responsible for cognitive functions. In addition, dopamine facilitates pair bonding in both male and female prairie voles. Thus, research on these rodent Romeos and Juliets reveals a recipe for a romantic cocktail: oxytocin and vasopressin, combined with a dash of dopamine. Of course, the studies suggest that this is a delicate and complex process, so it is not likely the love potion will be ready for mass marketing any time soon.

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◆ Oxytocin and the Neural Mechanisms Regulating Social Cognition and Affiliative Behavior. H. E. Ross and L. J. Young in Frontiers in Neuroendocrinology, Vol. 30, pages 534–547; 2009.

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Fascinating Facts

Did you know that.....

- The first albino rats to be bred in captivity were born to a single albino rat captured in a graveyard in England by Queen Victoria's royal rat catcher Jack Black.

- According to the Guinness Book of World Records the longest lived domestic rat died at seven years and four months of age (which far exceeds the 2-3 year expected lifespan.)

- The Bubonic Plague was not caused by rats but instead was caused by infected fleas that jumped off dead rats onto humans.

- Rats are routinely worshipped and fed in the Karni Devi, a temple completely devoted to them. These thousands of wild rats never gave any of their worshippers infected Bubonic fleas even during the plague years - scientists suspect this is because being territorial they kept invading rats (and their fleas) out of the area. Albino rats in the Karni Devi are considered incarnations of the Goddess Durga. Normal colored rats are believed to be incarnations of deceased followers of Karni Mata.

- The first astronaut rat launched from France into outer space in 1961.

- A rat's teeth are always yellow upon maturity (a rodent characteristic) and don't stop growing until the animal's death.

- Laboratory rats can survive 17-20 days without sleep before succumbing to death.

- Rats have been proven to make a laughter-like noise (unable to be heard by the human ear alone) when tickled and dream while sleeping.

- Gambian Pouch Rats have been trained to sniff out mines in war torn countries - due to their light weight they are far less likely to explode the mines then sniffer dogs are.

- The ancient Romans didn't distinguish rats and mice but instead called then Rattus Major (big rat) and Rattus Minor (little rat.)

- Rats have terrible eyesight and therefore are rarely seen in the middle of rooms or clearings where their whiskers aren't touching the perimeter of a landmark or wall.

- Rats use their tail to contol their body temperature because they cannot sweat.

- Beatrix Potter, the author of Peter Rabbit, was one of the first owners of a pet rat - an albino bred by none other than Queen Victoria's royal rat catcher Jack Black.

October Freebie

In this section you get the chance to get something for nothing. Helemaal gratis. Always a pleasure!

Breath-taking photography and inspirational messages makes this month's freebie a breath of fresh air.

http://www.theinterviewwithgod.com/popup-frame.html

(Thanks to Mum for sending me this)

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