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No formula for falling in love

Scientists study brains of those in, out of relationships

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Deep in the brain lies the reason we buy truckloads of roses, chocolates and teddy bears with hearts every Feb. 14.

Poets have struggled with words to explain this thing called love; now researchers like Helen Fisher at Rutgers University are trying to explain it with science, aiming high-powered functional magnetic resonance imaging at the brains of both happy lovers and those less fortunate: the recently dumped.

Fisher and her colleagues had happy lovers gaze at photos of the beloved and found activity in the right ventral tegmental area of the brain, the central region associated with the reward system.

"In this case," she says, "life's greatest prize."

But before we go too far, let's be honest about how well we truly understand the workings of love.

"It's in some ways still a black box," says Jennifer Chotiner, interim chair of biology at Mount St. Mary's College in Los Angeles, who has studied learning and memory in the brain.

"It's a tough thing to study in the laboratory," says Mark Kristal, a professor of behavioral neuroscience at the University of Buffalo. "Once you find people who are in love, you can't go back and find out what their brain formation was like before they were in love to see what changed."

The other problem, Kristal says, is that there are no good animal models for what we call romantic love. Swans are said to mate for life, though researchers tell us some couplings end in the equivalent of divorce. Moreover, when animals do stay true, "we're not sure that what bonds them together is what we call love," Kristal says.

So, we are left with humans and the emerging picture of the brain in love.

In one study, Fisher recruited 10 women and 7 men, ages 18 to 25, all intensely in love. Lovers were

interviewed, then shown photographs of their beloved, asked to count backward from a large number, then shown a photograph of someone they had "neutral" feelings toward, and told to count backward again. The dumped lovers - 10 women and five men - went through the same process, with photos of their former flames.

Fisher needed no MRI to observe that the happy lovers were "very happy," laughing and chatting. The dumped were quiet, forlorn and reported sleeping too much or not at all.

Using MRI, she found that rejected lovers showed much more activity in parts of the brain associated with high-risk investments, physical pain, and obsessive and controlling behavior.

Such information is useful as far as it goes, though the MRI scans don't show the precise brain chemistry. Scientists can view the chemistry to some extent using implants in the brain, but such experiments must be conducted with animals, not humans, raising a practical problem.

"How do you say a rat's in love?" Chotiner says.

What scientists have at this point is an idea of the key players in love.

Two brain peptides, vasopressin and oxytocin, have been shown to play a role in the long-term social bonding we see in mating, Kristal says. The neurotransmitter dopamine, he adds, "is certainly involved in the rewarding properties of love and sex."

He envisions some pattern in which perhaps smell, previous experience and pheromones (signals that enter the brain) trigger a chemical release that may involve the brain's amygdala, associated with fear and aggression, and the hypothalamus, which controls hormones. Then dopamine is released. Whether the brain follows such a mechanism, and what triggers it when we meet one person and not another, are the great mysteries, Kristal says.

Even if researchers pinpoint the brain regions and chemistry involved, there is still the matter of figuring out precisely how they work together to produce love, Chotiner says. "I'm not sure we'll ever answer that."

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