

**LEARN ABOUT  
LINH KIEU NGO'S  
WRITING PROCESS**

To learn about Linh Kieu Ngo's process of writing this essay, turn to *A Writer at Work* on pp. 181–82. How did Ngo combine quotation with paraphrase to integrate source material into his essay and avoid simply stringing quotes together?



ANASTASIA TOUFEXIS has been an associate editor of *Time*, senior editor of *Discover*, and editor in chief of *Psychology Today*. She has written on subjects as diverse as medicine, health and fitness, law, environment, education, science, and national and world news. Toufexis has won a number of awards for her writing, including a Knight-Wallace Fellowship at the University of Michigan and an Ocean Science Journalism Fellowship at Woods Hole Oceanographic Institution. She has also lectured on science writing at Columbia University, the University of North Carolina, and the School of Visual Arts in New York.

The following essay was originally published in 1993 in *Time* magazine. As you read, notice how Toufexis brings together a variety of sources of information to present a neurochemical perspective on love.

## Love: The Right Chemistry

**Anastasia Toufexis**

Love is a romantic designation for a most ordinary biological — or, shall we say, chemical? — process. A lot of nonsense is talked and written about it.

— Greta Garbo to Melvyn Douglas in *Ninotchka*

**O**.K., let's cut out all this nonsense about romantic love. Let's bring some scientific precision to the party. Let's put love under a microscope.

When rigorous people with Ph.D.s after their names do that, what they see is not some silly, senseless thing. No, their probe reveals that love rests firmly on the foundations of evolution, biology and chemistry. What seems on the surface to be irrational, intoxicated behavior is in fact part of nature's master strategy — a vital force that has helped humans survive, thrive and multiply through thousands of years. Says Michael Mills, a psychology professor at Loyola Marymount University in Los Angeles: "Love is our ancestors whispering in our ears."

It was on the plains of Africa about 4 million years ago, in the early days of the human species, that the notion of romantic love probably first began to blossom or at least that the first cascades of neurochemicals began flowing from the brain to the bloodstream to produce goofy grins and sweaty palms as men and women gazed deeply into each other's eyes. When mankind graduated from scuttling

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around on all fours to walking on two legs, this change made the whole person visible to fellow human beings for the first time. Sexual organs were in full display, as were other characteristics, from the color of eyes to the span of shoulders. As never before, each individual had a unique allure.

**While Western culture holds fast to the idea that true love flames forever . . . nature apparently meant passions to sputter out in something like four years.**

When the sparks flew, new ways of making love enabled sex to become a romantic encounter, not just a reproductive act. Although mounting mates from the rear was, and still is, the method favored among most animals, humans began to enjoy face-to-face couplings; both looks and personal attraction became a much greater part of the equation.

Romance served the evolutionary purpose of pulling males and females into long-term partnership, which was essential to child rearing. On open grasslands, one parent would have a hard — and dangerous — time handling a child while foraging for food. “If a woman was carrying the equivalent of a 20-lb. bowling ball in one arm and a pile of sticks in the other, it was ecologically critical to pair up with a mate to rear the young,” explains anthropologist Helen Fisher, author of *Anatomy of Love*.

While Western culture holds fast to the idea that true love flames forever (the movie *Bram Stoker's Dracula* has the Count carrying the torch beyond the grave), nature apparently meant passions to sputter out in something like four years. Primitive pairs stayed together just “long enough to rear one child through infancy,” says Fisher. Then each would find a new partner and start all over again.

What Fisher calls the “four-year itch” shows up unmistakably in today’s divorce statistics. In most of the 62 cultures she has studied, divorce rates peak around the fourth year of marriage. Additional youngsters help keep pairs together longer. If, say, a couple have another child three years after the first, as often occurs, then their union can be expected to last about four more years. That makes them ripe for the more familiar phenomenon portrayed in the Marilyn Monroe classic *The Seven-Year Itch*.

If, in nature’s design, romantic love is not eternal, neither is it exclusive. Less than 5% of mammals form rigorously faithful pairs. From the earliest days, contends Fisher, the human pattern has been “monogamy with clandestine adultery.” Occasional flings upped the chances that new combinations of genes would be passed on to the next generation. Men who sought new partners had more children. Contrary to common assumptions, women were just as likely to stray. “As long as prehistoric females were secretive about their extramarital affairs,” argues Fisher, “they could garner extra resources, life insurance, better genes and more varied DNA for their biological futures. . . .”

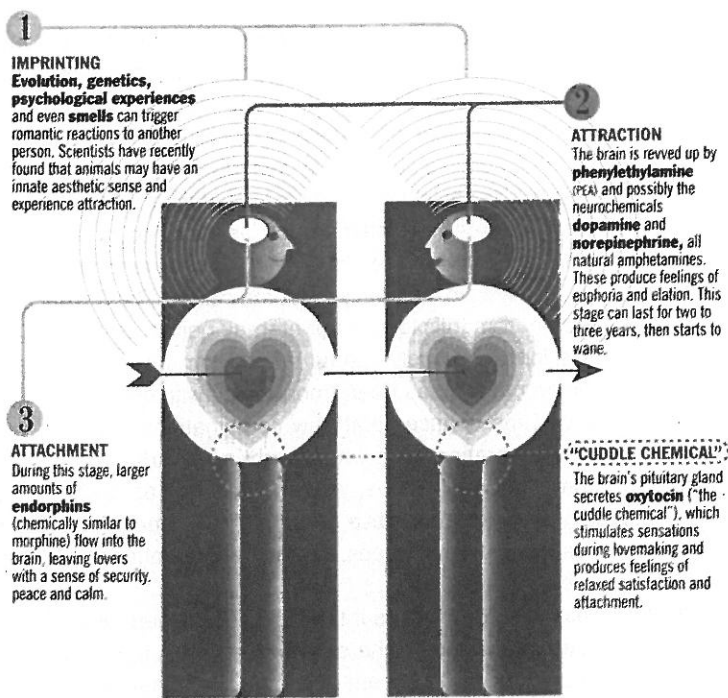
Lovers often claim that they feel as if they are being swept away. They’re not mistaken; they are literally flooded by chemicals, research suggests. A meeting of eyes, a touch of hands or a whiff of scent sets off a flood that starts in the brain and races along the nerves and through the blood. The results are familiar: flushed

skin, sweaty palms, heavy breathing. If love looks suspiciously like stress, the reason is simple: the chemical pathways are identical.

Above all, there is the sheer euphoria of falling in love — a not-so-surprising reaction, considering that many of the substances swamping the newly smitten are chemical cousins of amphetamines. They include dopamine, norepinephrine and especially phenylethylamine (PEA). Cole Porter knew what he was talking about when he wrote, "I get a kick out of you." "Love is a natural high," observes Anthony Walsh, author of *The Science of Love: Understanding Love and Its Effects on Mind and Body*. "PEA gives you that silly smile that you flash at strangers. When we meet someone who is attractive to us, the whistle blows at the PEA factory."

But phenylethylamine highs don't last forever, a fact that lends support to arguments that passionate romantic love is short-lived. As with any amphetamine, the body builds up a tolerance to PEA; thus it takes more and more of the substance to produce love's special kick. After two to three years, the body simply can't crank up the needed amount of PEA. And chewing on chocolate doesn't help, despite popular belief. The candy is high in PEA, but it fails to boost the body's supply.

Fizzling chemicals spell the end of delirious passion; for many people that marks the end of the liaison as well. It is particularly true for those whom Dr. Michael Liebowitz of the New York State Psychiatric Institute terms "attraction





junkies." They crave the intoxication of falling in love so much that they move frantically from affair to affair just as soon as the first rush of infatuation fades.

Still, many romances clearly endure beyond the first years. What accounts for that? Another set of chemicals, of course. The continued presence of a partner gradually steps up production in the brain of endorphins. Unlike the fizzy amphetamines, these are soothing substances. Natural pain-killers, they give lovers a sense of security, peace and calm. "That is one reason why it feels so horrible when we're abandoned or a lover dies," notes Fisher. "We don't have our daily hit of narcotics."

Researchers see a contrast between the heated infatuation induced by PEA, along with other amphetamine-like chemicals, and the more intimate attachment fostered and prolonged by endorphins. "Early love is when you love the way the other person makes you feel," explains psychiatrist Mark Goulston of the University of California, Los Angeles. "Mature love is when you love the person as he or she is." It is the difference between passionate and compassionate love, observes Walsh, a psychobiologist at Boise State University in Idaho. "It's Bon Jovi vs. Beethoven."

Oxytocin is another chemical that has recently been implicated in love. Produced by the brain, it sensitizes nerves and stimulates muscle contraction. In women it helps uterine contractions during childbirth as well as production of breast milk, and seems to inspire mothers to nuzzle their infants. Scientists speculate that oxytocin might encourage similar cuddling between adult women and men. The versatile chemical may also enhance orgasms. In one study of men, oxytocin increased to three to five times its normal level during climax, and it may soar even higher in women.

Chemicals may help explain (at least to scientists) the feelings of passion and compassion, but why do people tend to fall in love with one partner rather than a myriad of others? Once again, it's partly a function of evolution and biology. "Men are looking for maximal fertility in a mate," says Loyola Marymount's Mills. "That is in large part why females in the prime childbearing ages of 17 to 28 are so desirable." Men can size up youth and vitality in a glance, and studies indeed show that men fall in love quite rapidly. Women tumble more slowly, to a large degree because their requirements are more complex; they need more time to check the guy out. "Age is not vital," notes Mills, "but the ability to provide security, father children, share resources and hold a high status in society are all key factors."

Still, that does not explain why the way Mary walks and laughs makes Bill dizzy with desire while Marcia's gait and giggle leave him cold. "Nature has wired us for one special person," suggests Walsh, romantically. He rejects the idea that a woman or a man can be in love with two people at the same time. Each person carries in his or her mind a unique subliminal guide to the ideal partner, a "love map," to borrow a term coined by sexologist John Money of Johns Hopkins University.

Drawn from the people and experiences of childhood, the map is a record of whatever we found enticing and exciting — or disturbing and disgusting. Small feet, curly hair. The way our mothers patted our head or how our fathers told a joke. A fireman's uniform, a doctor's stethoscope. All the information gathered while growing up is imprinted in the brain's circuitry by adolescence. Partners never

meet each and every requirement, but a sufficient number of matches can light up the wires and signal, "It's love." Not every partner will be like the last one, since lovers may have different combinations of the characteristics favored by the map.

O.K., that's the scientific point of view. Satisfied? Probably not. To most people — with or without Ph.D.s — love will always be more than the sum of its natural parts. It's a commingling of body and soul, reality and imagination, poetry and phenylethylamine. In our deepest hearts, most of us harbor the hope that love will never fully yield up its secrets, that it will always elude our grasp.

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### MAKING CONNECTIONS: LOVE MAPS

The chemistry of love is easily summarized: Amphetamines fuel romance; endorphins and oxytocin sustain lasting heterosexual relationships. As Toufexis makes clear, however, these chemical reactions do not explain why specific people are initially attracted to each other. Toufexis observes that an initial attraction occurs because each of us carries a "unique subliminal guide" or "love map" (par. 17) that leads us unerringly to a partner.

With two or three other students, discuss these explanations for attraction between the sexes. Begin by briefly taking turns describing the qualities you are attracted to in a partner. Then, consider together the following questions as you discuss your love map:

- What role do factors such as family, friends, community, the media, and advertising play in constructing your love map?
- Do you think an individual's love map can change over time? If so, what might contribute to such changes?
- According to Toufexis, men typically look for "maximal fertility," whereas women look for security, resources, status, and a willingness to father children (par. 18). Does this explanation seem convincing to you? Why or why not?

### ANALYZING WRITING STRATEGIES



Basic Features

#### ● A Focused Explanation of the Concept

Obviously, essays explaining concepts cannot communicate everything that is known about a concept. Writers must limit the scope of their explanation. They choose a focus in part by considering the rhetorical situation — the purpose and audience — in which they are writing. Linh Kieu Ngo, for example, is writing for a college composition course, where he can expect his readers not to know very much about anthropology or research on cannibalism. For this reason, Ngo chose to give readers a rather simple overview of the research by explaining the three "most common" types of cannibalism (par. 6). To set up his explanation, Ngo uses an anecdote about survival cannibalism, the type his readers are most likely to have heard about. Beginning his essay by describing a familiar type of cannibalism confirms for readers what they already know and at the same time arouses curiosity and makes them want to learn more.