About the Authors

HARVEY MILKMAN is professor of psychology at Metropolitan State College in Denver, Colorado. From 1969 to 1972 he conducted research on the drug abuser's chosen drug with William Frosch at Bellevue Psychiatric Hospital in New York City. His theory of drug preference has been adopted by the National Institute on Drug Abuse as a major contribution to the literature. In 1980–81 he studied addictive behaviors in Africa, India, and southeast Asia. He is editor with Howard Shaffer of Addictions: Multidisciplinary Perspectives and Treatments, Lexington Books, 1985. His multidisciplinary model for addiction, "The Chemistry of Craving," written with Stanley Sunderwirth, was featured in the October 1983 issue of Psychology Today. Dr. Milkman has recently returned from a 10-month (1985–1986) Fulbright-Hays Lectureship award at the National University of Malaysia.

STANLEY SUNDERWIRTH is vice president for Academic Affairs at Philadelphia Community College. He has received five Fulbright Awards, four to Uruguay and one to India. In addition, he has held two NSF/AID consultancies to India and was invited in 1979 by the Instituto National de Docencia of Uruguay to present a three-week seminar. He has written more than fifty scientific publications including his most recent chapter, "Addiction and Neurotransmission," in Addictions: Multidisciplinary Perspectives and Treatments, edited by Harvey Milkman and Howard Shaffer, Lexington Books, 1985. Dr. Sunderwirth recently discussed the chemistry of addiction on the nationally televised program, Body Watch.
do it without stickin’ a fucking needle in your arm.” He remembers always being scrutinized and challenged by other members of the group about minute details of his demeanor. After several months of being constantly and thoroughly checked for his motives and attitudes he noticed that he began checking himself. “All of a sudden you caught yourself like, I’m doing something wrong. I shouldn’t be doing this... you started to feel guilt. For once you started feeling happy. You noticed the birds singing and the sun’s shining, and they’re gonna let us out in the park to throw the football around.”

When positive experiences such as these occur, the result is often enhanced self-esteem and a corresponding reduction in alienated-alienating behaviors. Philip now regards having “stuck out” the therapeutic community as the best decision of his life. He views the TC as the only place where a hard-core drug abuser can have a chance at getting his life together. He feels that in the course of treatment, he came across many people who helped him to “clean up,” but the person he thanks most is himself. After fourteen months of complete abstinence, Philip reported that he reached a point where he made the decision to stay clean permanently. He realized that there was no way that he could continue doing heroin and be a normal human being, “and what I want to be is a normal human being, so I decided never to do it again.”

Philip was hired as a counselor in the therapeutic community. He has been able to use his drug abuse and treatment experiences to guide others through the recovery process. At the time of this writing he has been entirely drug-free for six years.

Love Jones

Some addicts, particularly ghetto blacks, describe the insatiable craving for an elusive, unattainable, yet tantalizing lover as a “jones.” A jones means that you’ve got a habit—a bad habit. Eventually, it might even do you in. As with uncontrolled dependence on heroin, no matter how much you get, you always want more. Like an infant who has been abandoned by its mother, you fall to pieces when “mamma” won’t give you a “fix.”

We can all catch a glimpse of ourselves in this grim, shadow side of romance. In proper proportion, the majestic clockwork of love—a synchronized blend of arousal, satiation, and fantasy—gives rise to
life's most fulfilling experience. By nature, we become impassioned by elements that create or sustain life. But all too often the delicate process goes amiss; angels transform into devils, joy becomes jealousy, and heaven changes to hell. The nightmare of tormenting love is nothing but a miscarriage of our natural attraction toward people who evoke feelings of safety and pleasure. And so it is with all addictions; they are self-destructive outgrowths of adaptive, life-enhancing behaviors.

Indeed the phenomenon of infatuation is so powerful that some people compulsively attempt to recreate the experience, time and time again. In simplest terms, falling in love means thinking about another person all the time. In *Love and Limerence: The Experience of Being in Love*, Dorothy Tenov describes the symptoms of romantic love, which she collectively calls limerence. In limerence there is constant thought about one person, to the exclusion of all others, as a possible sex partner. When for some reason the prospective lover is not readily taken, romantic sentiments are further intensified. Obsessed suitors are able to achieve some degree of solace through rich and elaborate fantasies of lovemaking and courtship. If the "chosen" shows even the slightest inclination toward amorous reciprocation, feelings of elation are likely to follow. For a state of true limerence to exist, at least the potential for mating must exist, tinged with an umbra of uncertainty or doubt about the future of the relationship. Therefore, the answer to your question is, yes—do play "hard to get."

A brief excursion into the legend of St. Valentinus, the unofficial patron saint of romance, will illuminate Tenov's portrait of limerence. During his reign, the Roman Emperor Claudius Gothicus issued a decree that all Roman citizens must worship and pay homage to the twelve Roman gods. Valentinus is said to have been a man of learning and a devout Christian. He refused to forsake his religion and was arrested for disobedience, a crime analogous to treason and punishable by death. He was kept in prison until the date of his scheduled execution.

During his captivity, Valentinus met a beautiful young woman named Julia, who, like love itself, was completely blind. She was the daughter of the jailer, who recognized Valentinus as a learned man. He appealed to Valentinus to provide Julia with an education. She was delighted by Valentinus's teachings and cherished his accounts of nature and God. Julia confessed to Valentinus that each day she prayed for sight so that she could discover all the beauty that he had described. Valentinus is said to have assured her, "God does what is best for us only if we believe in Him." As the story goes, they sat quietly in prayer when suddenly the prison cell was enveloped by a brilliant white light. Julia's shrill voice pierced the air. "Valentinus, I can see," she shrieked, "I can see!"

On the eve of his death, Valentinus wrote a note to Julia urging her to remain close to God, even in his absence. He signed it, "From Your Valentine." His death sentence was carried out the next day, February 14, 270 A.D., near a gate that was named Porta Valentina, in his honor. He was later buried at what is now the Church of Praxedes in Rome. According to the legend, Julia planted a pink-blossomed almond tree near his grave, which has endured as a symbol of abiding love and affection.

Undoubtedly if Tenov, or her soul from a previous life, could have observed the legendary courtship, she would have concluded that indeed a strong state of limerence had occurred. Julia, the blind child of a watchful father, presumably had little opportunity for intimate male contact. Valentinus, even though he was a prisoner, was as close as she might ever come to an attainable lover. Admittedly, the probability of actualizing a sexual relationship was quite remote, but Julia's blindness might have intensified her romantic fantasies. Valentinus, knowing that he was to die, might well have telegraphed his natural desires to be wanted and loved. Of course the slightest hint from Valentinus that Julia's affection might be reciprocal would fuel her desire even more. Finally, the impending execution—particularly when we consider that Julia must have prayed for Valentinus' life, and on some level must have believed that God would spare him—most definitely meets Tenov's criterion of uncertainty regarding the future.

In some sense, the abrupt curtailment of Julia's short-lived romance was a blessing in disguise. Had Valentinus's sentence been commuted to life imprisonment, we can speculate that Julia would have inherited an even more difficult predicament. She would have continuously longed for the love of her life: the unattainable soul mate who helped her to see beauty in nature and affirmed her faith in God. The limitations of her childhood, coupled with the incomparable joy that she experienced with Valentinus, would etch a per-
permanent imprint on her psyche. The fleeting moments of pleasure that she could extract from periodic visits to his cell would only enlarge her desire and prolong her suffering. Indiscipline would surface, as rationality would eventually dwindle to a mere silent observer. The folly of love would progressively erode her happiness, and eventually she would reach the same tortured state that many of us have endured—feeling desperately entrapped in love’s crushing grip. Her behavior might well have been characterized by compulsion, loss of control, and continuation despite harmful consequences.

We can all identify with Julia’s hypothetical plight. The combination of psychological need and social pressure “to be in love” is so great that we compulsively hang in, even after the game is over. In the short run, having a lover, no matter how problematic the relationship, serves to deflect the ubiquitous existential concern: “I am afraid to face my life and death alone.” Objectively it is not whether two people stay together, but how they stay together, that separates genuine intimacy from love addiction. In a healthy love relationship both members strive to enrich and fulfill their lives through intense, mutual involvement. The love addict, despite a multitude of protestations to the contrary, cares little about the well-being of his or her partner. Romance junkies demand or beg for approval and affection, in an escalating cycle of disappointment and reprisal. Eventually harmful consequences result, including deterioration of work, social, or health functions. Alcohol, for example, may be used as a temporary stopgap for feelings of anger and despair. Unfortunately, most demoralized lovers who take refuge in the womb of spirits cannot honestly echo the famous boast attributed to W. C. Fields: “It was a woman who drove me to drink and I haven’t had the decency to thank her.”

Those who become addicted usually lack confidence in their ability to cope without some form of support, either real or imagined, from a love object. Donald Klein and Michael Liebowitz of the New York State Psychiatric Institute have proposed the term hysteroid dysphoria—a chronic and intense form of lovesickness—as a new category of mental disturbance. The disorder, which they have observed with surprising frequency in the course of their psychiatric practice, is characterized by depression, depletion of energy, and increased appetite in response to feelings of rejection. Conversely, when a romantic figure shows only minimal signs of approval, hyste-

teroids react with increased energy and euphoria. People who suffer from this disturbance seem to fall in love more easily than others, and with less discretion. Their moods are marked by great sensitivity to even the slightest sign of disapproval, particularly from people in whom they have made romantic investments.

If you seem to have more than an academic interest in this syndrome, then perhaps you may be questioning your own propensity as a love addict. Fear not, nearly everyone has a similar reaction: “Is that me?” Don’t forget, however, that you can have mild, moderate, or severe degrees of love dependence, as with addiction to food, drugs, or alcohol, and the symptoms are remarkably the same. If your relationship meets three or more of the criteria listed below, then love may be your Achilles heel.

**Denial.** Your friends and family say you’re in a bad relationship, but you don’t agree.

**Immediacy.** You require frequent emergency “pow-wows” with your lover in social and business situations.

**Compulsion.** You’ve broken up (seriously) at least twice, yet you always make up.

**Loss of Control.** You often feel powerless to control your feelings or behavior with regard to your lover.

**Progression.** Over time you suspect that your relationship has been on a downward spiral.

**Withdrawal.** You become depressed and experience physical disturbance (loss of sleep or altered eating and drinking patterns) when distanced from your lover.

It is love’s unequaled capacity to profoundly influence each of the three pleasure planes—arousal, satiation, and fantasy—that qualifies it as the pièce de résistance among the addictions. While the human inclination toward intimate pairing affixes a territory within which mating can occur, it also holds the trigger to the most primitive impulses on earth. An instant of reflection on love’s hearty contribution to homicide and suicide reminds us of the horrifying consequences of uncontrolled passion.
Poetry, the language of love, has been used for ages to express the agony and ecstasy of life's most exalted emotion. Untimely death, the ultimate consequence of a disturbance in nature, has been a central theme in love stories since time immemorial. In his classic poem, "Porphyria's Lover," Robert Browning encapsulates a man's compulsion to murder his sweetheart. Suddenly realizing the impermanence of Porphyria's affection, her lover is overwhelmed by an impulse to preserve forever his moment of ecstasy.

Be sure I look'd up at her eyes
Happy and proud; at last I knew
Porphyria worshipp'd me; surprise
Made my heart swell, and still it grew
While I debated what to do.
That moment she was mine, mine, fair,
Perfectly pure and good: I found
A thing to do, and all her hair
In one long yellow string I wound
Three times her little throat around,
And strangled her. No pain felt she;
I am quite sure she felt no pain.

And few have ever savored a romantic rhyme without being touched by Edgar Allan Poe's masterpiece of morbid obsession, "Annabel Lee":

For the moon never beams without bringing me dreams
Of the beautiful Annabel Lee,
And the stars never rise but I feel the bright eyes
Of the beautiful Annabel Lee.
And so, all the night-tide I lie down by the side
Of my darling, my darling, my life, and my bride,
In her sepulcher there by the sea,
In her tomb by the sounding sea.

While the language of love is undoubtedly poetry, the language of the brain where love abides is chemistry. In this sense the language of love is chemistry. We respond chemically to other human beings. At the level of the neuron, our synapses are stirred by a lover's furtive glance. Love itself has become a legitimate target for neurochemical analysis. And why not? Through the use of positron-emission tomography (PET), scientists can now take pictures of the brain at work. It has been shown that emotion-laden events trigger the release of neurotransmitters that affect particular regions of the brain. In anxious people, for example, neurochemical activity increases in the right brain hemisphere. Altered neurotransmission in people with severe depression or schizophrenia has been the focus of intensive brain research for the past three decades. Some neuroscientists have now turned their attention to the study of positive feeling states.

According to Michael Liebowitz, author of The Chemistry of Love, a substance known to biochemists as phenylethylamine or PEA is released in the brain when we fall in love. The PEA molecule, which is considered an excitatory amine, bears striking structural similarity to the pharmaceutically manufactured stimulant amphetamine. Liebowitz regards the accelerated use of PEA, which occurs during infatuation, as the key to feelings of excitation, exhilaration, and euphoria.

An important similarity between PEA and amphetamine is that the benzene ring is basic to each of their molecular structures. The nineteenth-century German chemist Kekule, who dreamed about the chemical composition of benzene, may have been even more of a seer than anyone has yet realized. Kekule had spent many hours trying to discover the structure of the benzene molecule. One evening while dozing in front of a fire, in a half-dream state he imagined the leaping flames to be snakes which twisted and turned. Suddenly the snakes curled around and held onto their tails with their mouths. In this moment Kekule awoke and realized that he had visualized the structure of benzene, which is a closed carbon ring, as he had imagined the snakes to be. He is now credited with having discovered the chemical structure of benzene. Until now, however, Kekule's snake has evaded recognition as the same cunning serpent who tempted Eve to eat from the Tree of Knowledge. Indeed, there is the sense of having violated our own innocence as we trespass on the heretofore unspoiled Garden of Romance. We feel unprecedented shame as we reduce one of life's most exalted experiences to measurable fluctuations in brain chemistry.
Yet rapidly advancing brain science will not be slowed by the sentimental reigns of romance. No matter how mystical we perceive love to be, we are now aware of its neurochemical aspects. Indeed, remarkable biological parallels exist between pathological drug use and the unhealthy need for affection. Becoming dependent on love may be described as a dynamic process with two distinct biochemical phases: infatuation and attachment.

Infatuation is usually an experience of heightened energy and feelings of euphoria. According to Liebowitz, the initial period of psychosexual attraction produces increased concentrations of the neurotransmitter-like substance phenylethylamine. The brain responds to this chemical in much the same fashion that it would to amphetamine or cocaine; infatuated lovers seem to experience boundless energy, elation, and a remarkable sense of well-being. They have no problem in "painting the town red," then going to work, then going out the following night and doing it all over again.

After a short time, however, the speedy feeling appears to reach a maximum level, and lovers begin to recognize that their relationship is on a plateau. The romance remains exciting, yet the remarkable sensations of invigoration and euphoria appear to be dwindling. In chemical terms, the pleasure of falling in love is derived not from increased production of PEA, but rather from steady increases in the rate of PEA production. When PEA acceleration reaches zero, that is, when increments in the rate of chemical reward have stopped, the honeymoon is over.

At this juncture, one of two possible biochemical processes becomes operative: amphetamine-like withdrawal, or a shift to an endorphin-mediated relationship. Long-term lovers are able to make the transition from zooming around in the fast lane to enjoying cuddles and quiet evenings at home. But recall the chemistry of contentment. The prolonged love-swoon is, after all, an opiate-mediated experience. The addictive quality of romantic attachment becomes painfully obvious during periods of separation. As in the examples of Browning's "Porphyria's Lover" or Poe's "Annabel Lee," sudden or prolonged abstinence can cause paranoid thoughts and deranged conduct. Forlorn satiation types may become as pathetic as any heroin junkie who suddenly finds himself without a fix. Love addicts may survive for years, completely undetected, so long as there is a constant drug supply. However, they may cheat, lie, steal, or kill—even for a minimal dose—to avoid the dreaded pain of withdrawal.
Some people become so dependent on the rush of increased concentrations of PEA that they encounter severe depression, fatigue, and lethargy as their rate of excitatory neurotransmission begins to level off. People who compulsively seek new lovers are likely to be arousal types who require increasing levels of neuronal excitation to feel intact. They find it exruciatingly difficult to adjust to the endorphin phase of love. From a biological standpoint, the frequently held belief that sex is the most important part of a person's life is little more than a self-serving justification for poorly modulated excitatory biochemistry. While nature sets a biochemical predilection toward arousal, personal history directs the development of more or less successful styles of coping.

Patrick Carnes, author of *The Sexual Addiction*, portrays the promiscuous love addict as a man who spends his last few dollars for half an hour with a prostitute, even though his child needs a pair of shoes, or as a salesman who earnestly begins each day trying to peddle his wares, but frequents the local porno shop instead. The sex addict may also be a woman whose job as an intercity conference coordinator serves as a cover for bar and bed hopping in nearly every location she visits. Consistent with Liebowitz's theory of neurochemical adaptation, sex addicts report the need for continuous escalation in the intensity of their sexual encounters.

Peter recalls being severely reprimanded for thumb sucking as a small child. While in junior high school he discovered that masturbation while gazing at pictures of women could provide some relief from his feelings of anxiety and basic unattractiveness to girls. Throughout high school he felt awkward and isolated from his classmates. Compulsive masturbation became Peter's preferred means to cope with even the slightest degree of stress.

At the age of twenty-one he married the first girl he had sex with and experienced a short flight into health until his wife became pregnant. Shortly thereafter he began prowling the bars, searching for any female who could offer him novel stimulation. By the age of twenty-six he had his first adulterous affair and soon afterward had intercourse with a prostitute. He became immediately “hooked,” and by the age of thirty-three he described himself as a compulsive “trick”—the term prostitutes use for their paying customers. At first Peter would always use protection against venereal disease, but as his addiction progressed he became more and more indiscreet about the time, place, and people with whom he would have sex.

After twelve years of marriage and three children, Peter felt so guilty about his compulsion for sexual excitement that he asked his wife for a divorce. He quickly remarried, however, wanting to believe that if he could only make an honest commitment to a different partner, he would then gain control over his sexual appetite. Within days after the wedding, Peter found himself back to masturbation, and within months he returned to cruising the streets and bars. At this point, even the thought of sex, or look at a girlie magazine, would ignite his compulsion to score. Finally he reached a state of “incomprehensible demoralization,” as he began to have fantasies of suicide and was willing to become a pimp in order to have ready access to prostitutes.

At this time, Peter found his way to Alcoholics Anonymous. He began to work on the AA Twelve Steps, recognizing that sexaholism and alcoholism are virtually the same disease. He completed the first step when he admitted that he was powerless over lust—that his life had become unmanageable. He completed the second step when he slowly came to believe that a power greater than himself could restore him to sanity. With the help of AA, Peter began to feel an unprecedented release from sexual compulsion. He felt teachable for the first time since childhood. He became willing and committed to stop changing sex partners, even in fantasy.

After seventeen years of sexaholic sobriety, Peter now views his previous existence as a life of slavery, when he was emotionally and spiritually dead. He regards the years of compulsive searching as a period of running—running from others, himself, and God. He now believes that his continuing freedom is predicated on maintaining a spiritual program and never forgetting that although he has been set free, he will never be cured. He lives one day at a time, constantly subduing the wayward sexual impulse. He intends never again to allow himself even a “nip.”

There comes a turning point in the life history of many cocaine abusers when they make a switch to opiate drugs. Peter's transition from a raging sexaholic to a person who has rediscovered himself, his family, and God may be a subtle version of changing from stimulant to narcotic drugs. Most of us can identify with Peter's experi-
senses suddenly explode—art, nature, theater, and music become even more potent than of the times when you gaze into your lover's eyes and all of infinity opens before you; you feel one with your partner and at one with exciting, posthoneymoon period.

Yet somehow, arousal and satiation—extremely important aspects of love—just don't seem to describe its spiritual quality. What of the times when you gaze into your lover's eyes and all of infinity opens before you; you feel one with your partner and at one with the world around you, as if time itself has stopped. Your aesthetic senses suddenly explode—art, nature, theater, and music become havens for your courtship.

It would seem that there must be another chemical mediator, even more potent than PEA or endorphin, to account for these transcendent experiences. In fact, Liebowitz postulates that there is some additional neurochemical reaction... which may be similar to (although usually briefer than) whatever the psychedelic drugs do to our brains” that is responsible for the spiritual wonders of love. Liebowitz suspects that there is a psychedelic version of PEA that endows transcendent love with its mystical quality. As William Shakespeare wrote in Sonnet 29:

Haply I think on thee,—and then my state,
Like to the lark at break of day arising
From sullen earth, sings hymns at heaven’s gate;
For thy sweet love remember’d such wealth brings
That then I scorn to change my state with kings.

If Liebowitz is correct then perhaps there is a synthetic drug that mimics the action of the suspected neurochemical Aphrodite. It has long been recognized, and particularly underscored by the discovery of endorphin, that addictive drugs are structurally quite similar to naturally occurring brain chemicals. Is there a man-made drug that opens the combination to the vault of mystical love?

On the street, they call it Ecstasy; in the laboratory it is properly referred to as 3,4-methylenedioxymethamphetamine, or MDMA. Advocates claim that it produces a pleasant two- to four-hour high that dissolves anxiety, makes people less defensive, enhances communication and insight, and leaves people more emotionally open. MDMA is less potent and differs only slightly in chemical structure from the psychedelic MDA, known in the 60s as the “love drug.” Ecstasy seems to combine some of the hallucinogenic effects of mescaline with the stimulant effects of amphetamine. Those who endorse Ecstasy cite hundreds of case histories where MDMA was used as a tool in psychotherapy by releasing patients from the fear of emotional injury.

Opponents believe that the drug effects are unpredictable. Increased blood pressure, sweating, blurred vision, involuntary teeth clenching, and biting of the inside of the cheek have been observed during experimental trials. Psychopharmacologists Lewis Seiden and Charles Schuster of the University of Chicago have reported alarmingly low levels of serotonin (a neurotransmitter involved in the regulation of sex, aggression, sleep, and mood) after analyzing data from their studies conducted on rats and guinea pigs. Ronald H. Siegel, a psychopharmacologist at UCLA, finds that under high doses people may become insane rather than ecstatic; some may assume a fetal position for several days. The dose levels that Seiden and Schuster have associated with brain damage are only two to three times greater than the average street dose. Meanwhile, U.S. officials claim that drug treatment programs around the United States have reported numerous cases of psychotic episodes among MDMA users. The Drug Enforcement Agency views Ecstasy as a rapidly spreading recreational drug that can cause psychosis and permanent brain damage. In June 1985 Ecstasy was banned from medical use via a one-year emergency Schedule I controlled-substance classification, the same classification used for heroin and LSD.

Basement chemists, however, scoff at the government’s effort to abolish MDMA. Current drug laws define drugs by their precise chemical structure. “Designer drugs”—compounds that preserve the psychoactive quality of the drugs but slightly alter their molecular structures—have become devious ways to skirt the law.

On counterpoint, Congress is now considering legislation that would prohibit the manufacture and distribution of drugs similar to those previously placed on Schedule I. All this seems terribly déjà vu. Wasn’t love already criminalized in 1984 by George Orwell’s Big Brother?