Right Now

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TECTONIC TREATISE

Swerves

More than 2,000 years ago, a Roman named Titus Lucretius Carus set down his thoughts on topics ranging from creation to religion to death. The format for his observations, many of them highly technical and uncannily modern, was a single elegant poem: readers would stomach such material more easily if it was presented artfully, he suggested, just as a child would drink bitter medicine more readily out of a cup with a honeyed rim.

He was right. In later centuries, when that poem, *De rerum natura* ("On the Nature of Things"), came under siege for its subversive potential, the work's captivating beauty would be key to its survival. Still, it barely weathered the incursions of time and hostile authorities, which conspired to put it out of view for nearly a millennium. The improbable story of how it re-emerged, and how the mindset it advocated informs our present, is the subject of *The Swerve: How the World Became Modern* (Norton), a new book by Cogan University Professor and noted Shakespeare scholar Stephen Greenblatt, to be published in September.

Even with its sugary rim, *De rerum natura* is not an easy read. At six books and some 7,400 lines of Latin, laden with allusion, philosophical reflection, and long forays into ancient physics, the work is demanding even for a highly trained classicist, which Greenblatt, an English professor, readily admits he is not. But neither is he addressing an audience of specialists. "I didn't want to write a book whose central concern is a technical analysis of Lucretius's poem or the detailed reception history of that poem in later literary works," he says. "I wanted to tell a story about its power—how it helped inspire the Renaissance and remade our whole culture."

Watching this power slowly unfold is

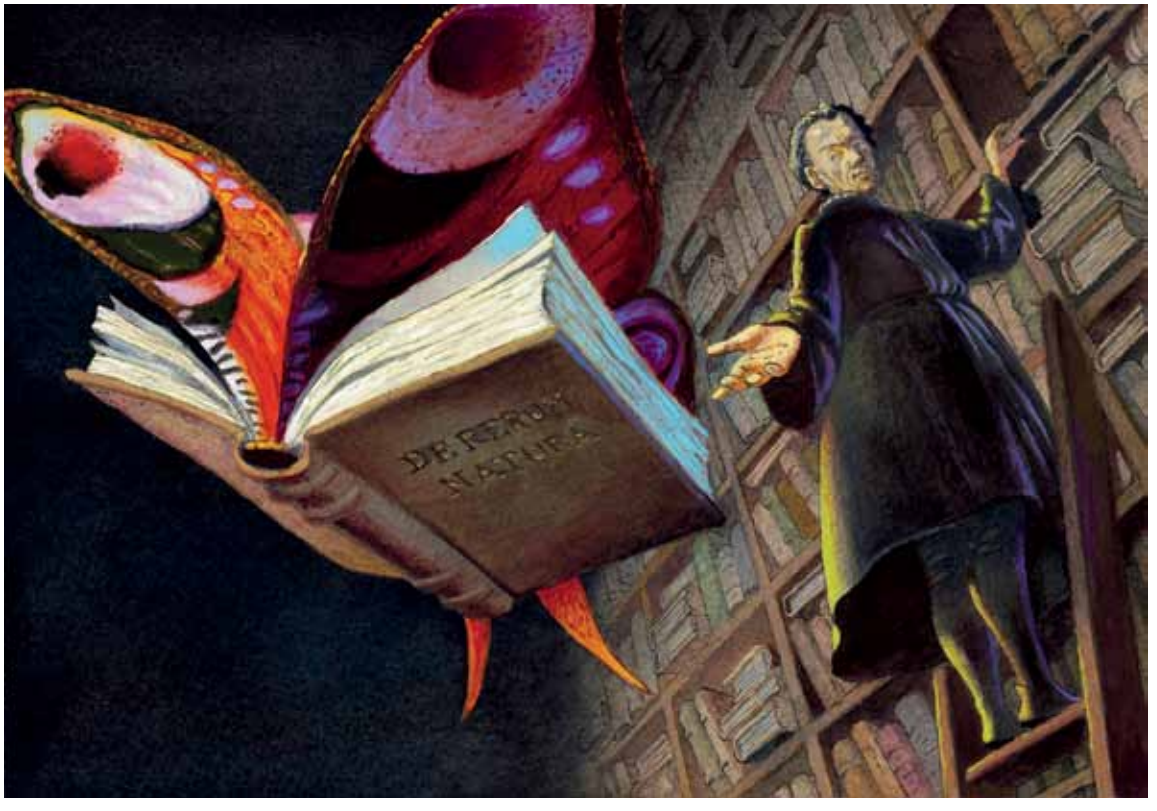

Illustration by Boris Kulikov

one of the book's pleasures. There is in Greenblatt's work a keen appreciation that the course of history is at any moment perched on a razor's edge, and that many of the chains of consequence culminating in the modern *Zeitgeist* can be traced to seemingly inconsequential instances—butterflies flapping their wings to beget faraway storms. In *Swerve*, the butterfly is Poggio Bracciolini, an unemployed papal secretary who, finding himself by chance with the time and the means to hunt down copies of ancient texts, stumbled upon a manuscript of Lucretius in a German monastery in 1417. He then did something that would resonate for centuries: he ordered that the poem be copied, and thereby delivered a long-dead Roman's philosophy, conceived in another time and largely forgotten, into a new era.

It was not an era friendly to what Lucretius had to say. The Roman poet had modeled the universe as a collection of tiny atom-like particles in perpetual motion (the titular "swerve" was his term for the deviation that leads them to collide and compose larger forms). His scheme countenanced no judgment or indeed life after death, just dissemination of body and soul back into particles. The imperative, therefore, said Lucretius, echoing the refrain of his Greek intellectual forebear Epicurus, was for man to maximize pleasure and minimize pain in the one life available to him. In the Lucretian universe it was unthinkable that the gods, caught up in their own pleasures, could take the slightest interest in human affairs. Man was free to make his own way. Part of the reason the poem disappeared in the first place, Greenblatt shows, was that it did not sit well with religious authorities who wished their subjects to cower before divine judgment and who touted earthly suffering as a path to an afterlife. In Poggio's world, with a Renaissance papacy bent on protecting its prerogatives against perceived heresy, the Roman's ideas were disturbing indeed.

"For the Renaissance world, a Christian world, the question was, 'What happens when something comes along that violates every one of your fundamental beliefs?'" Greenblatt says. "How were these radical things transmitted in a time when there was quite a repressive apparatus?" It was a question that Poggio's character helped to answer. Himself subject to the service of a repressive Church as the secretary to a notoriously corrupt pope, he found freedom in discovering and perusing the wisdom of the ancients.

There were others like him. Once Poggio delivered *De rerum natura* from its monastery prison, the beauty of the poem and the power of its ideas did their work. Greenblatt traces the emergence, from an exposition, and ambivalent denial, in the writing of the humanist Lorenzo Valla, to reproduction by Machiavelli and an appearance in the pages of Thomas More, to its place in the thought of the unhappy Giordano Bruno, the sixteenth-century friar whose execution is a testament to the murderous reflexes of a threatened Church.

That was only the beginning. When he read the poem initially, Greenblatt recalls, he was amazed at its apparent prescience. "So much that is in Einstein or Freud or Darwin or Marx was there," he says. "I was flabbergasted." And indeed, from Galileo to Darwin to Einstein, who paid tribute to Lucretius in the preface to a 1924 translation of the poet's work, science would begin to describe empirically a universe of atomic particles with behaviors dictated by forces independent of the divine. Meanwhile, Greenblatt finds Lucretius in the very roots of the American tradition: "I am an Epicurean," proclaimed Thomas Jefferson, the owner of at least five editions of *De rerum natura*, who put his stamp on a Declaration of Independence emphasizing the "pursuit of happiness."

In the end, Greenblatt acknowledges, history is complicated—there is not a straight line between Lucretius and the modern world. "And yet the vital connection is there," he writes. "Hidden behind the worldview I recognize as my own is an ancient poem, a poem once lost, apparently irrevocably, and then found."

—CHRISTIAN FLOW

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GENDERED BENDER

Women and Alcohol

WHEN Shelly F. Greenfield joined the Harvard Medical School faculty in 1992, scientists were just beginning to document the fact that men and women become addicted to alcohol, and recover from that illness, differently—to recognize that "there may be gender-specific variables that affect health," says the professor of psychiatry at McLean Hospital.

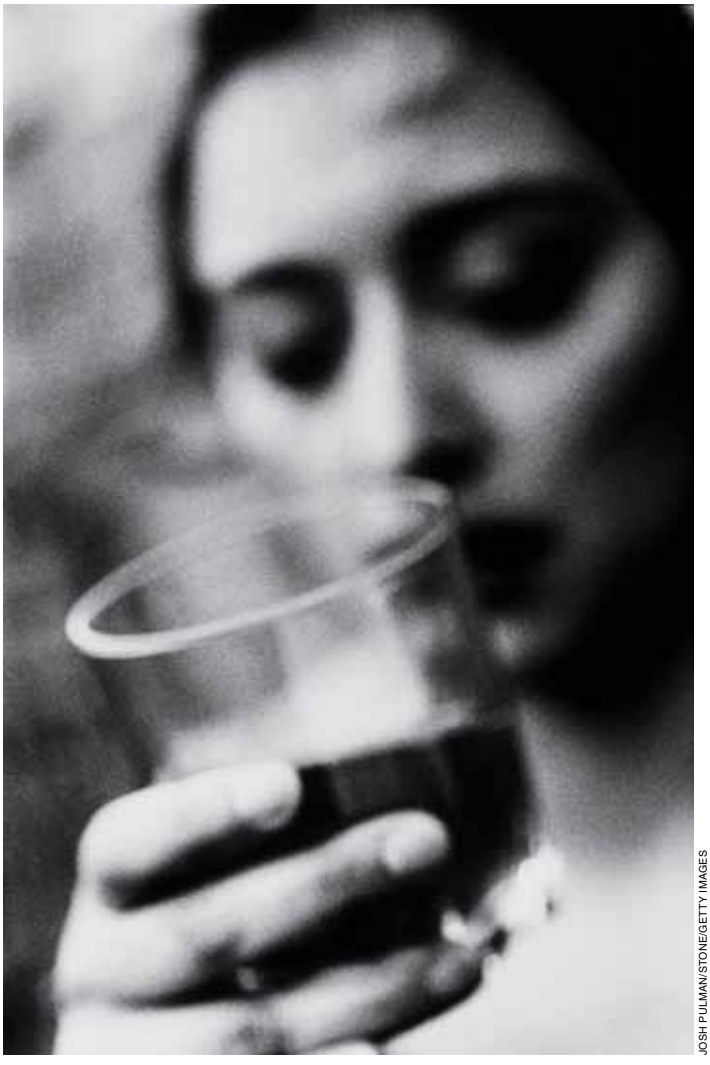
During the last 15 years, scientists have documented notable gender differences in the physiological effects of alcohol—differences summed up in *Women & Addiction*, a 2009 volume co-edited by Greenfield, who has pioneered more effective treatment programs for women struggling with addiction to alcohol and other substances. Women initially metabolize only about a quarter as much alcohol in the stomach and intestines as men do (a fact not documented until 1990); consequently, more alcohol enters the bloodstream as ethanol. Women's generally lower body mass, and lower body water content, also act to intensify alcohol's effects.

Due at least partly to these physiological differences, the disease of alcohol dependence proceeds on a faster course in women, requiring medical treatment four years sooner, on average, than for male problem drinkers. Alcohol-addicted women are also quicker to develop cirrho-

sis, fatty liver, and cognitive impairment, and have a greater risk of dying in alcohol-related accidents than men do. These gender differences are not confined to humans: female rats become addicted to a wide range of substances, including alcohol, nicotine, cocaine, heroin, and methamphetamines, more quickly than males.

Epidemiological data suggest why earlier studies of alcoholism used mostly men: as recently as the early 1980s, the ratio of alcohol-dependent men to alcohol-dependent women in the United States was 5:1. By the early 1990s, though, that ratio had narrowed to 2.5:1—a trend mirrored in Europe. A common explanation blames changing social norms: for women to drink in public or talk about having a glass of wine with dinner at home became more socially acceptable, even fashionable. Data on the age at which teenagers first try alcohol also reflect this cultural shift: girls used to wait much longer than boys to take their first drink, but since the 1990s, that gap, too, has disappeared.

The male-female gaps have narrowed not only for alcohol but for other substances—a fact that has made Greenfield's work increasingly important. Taking issue with the notion that addiction treatment strategies developed for men will work equally well for women, she and colleagues have developed a treatment manual with a focus on issues specific to women—for example, their tendency to act as caretakers, sometimes to the exclusion of their own needs. A pilot study of this woman-centered approach found it to be just as effective as a typical, mixed-gender, 12-week treatment program during the course of treatment; more significant are the results indicating that after six months, women from the all-female group continued to improve, whereas women in the mixed group were likely to have relapsed. Women with "low self-efficacy" (a lack of faith in their own ability to stay clean), who have proven more vulnerable to relapse with typical treatment, did best in the all-female treatment group, faring even better than women with greater self-confidence. Perhaps, says Greenfield, the woman-focused program, administered in a single-gender environment, "isn't important for all women, but will be really essential" for some.



JOSH PULMAN/STONE/GETTY IMAGES

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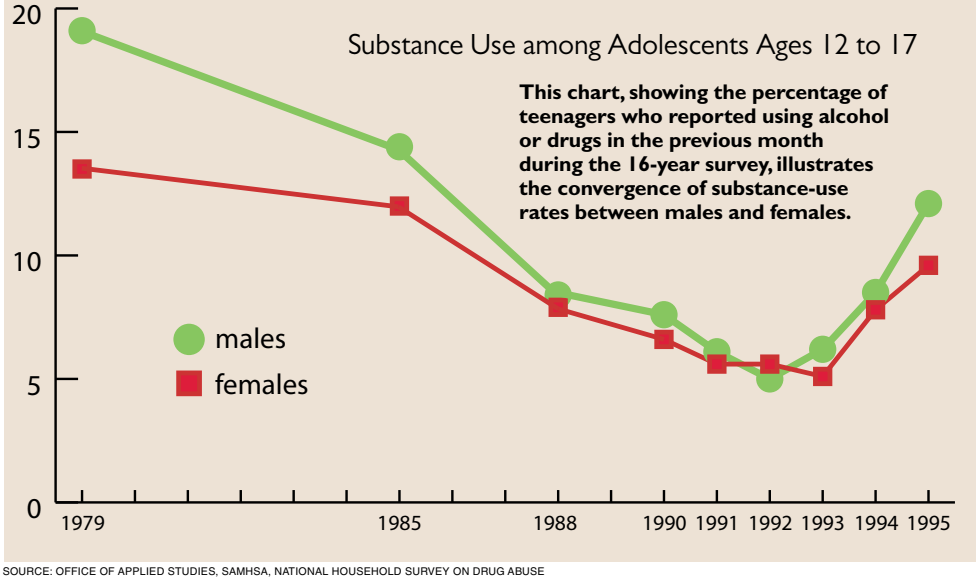
Greenfield believes the combination of woman-centered content and group dynamics are what make her treatment so effective. In the all-female groups, "From day one, people shared personal information very quickly," she reports. "There seems to be a kind of bond of understanding." Seeking to quantify the dynamics of this supportive environment, Greenfield and colleagues are monitoring so-called "affiliative statements" in the different treatment groups by tallying how many times one group member voices support or empathy



SOURCE: OFFICE OF APPLIED STUDIES, SAMHSA, NATIONAL HOUSEHOLD SURVEY ON DRUG ABUSE

for another. In particular, tabulating the dynamics of the mixed-gender groups enables them to compare the flow of these statements between men and women.

Following up the pilot study, Greenfield is now evaluating her woman-focused treatment in a randomized controlled trial with a larger group. Meanwhile, she is gratified by the "explosion" of work on women and addiction. If anything, she says, there may now be a shortage of researchers who are investigating factors specific to men, because the treatments for male addicts were developed before recent discoveries about addiction dynamics. "People often ask, 'Well, what about men? Is there something that would be most helpful to *their* recovery?'" she reports. "That's a different question, and we don't know the answer."

—ELIZABETH GUDRAIS

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BLASTING BLAZES

Snuffing Flames with Electricity

THREE YEARS AGO, the Defense Advanced Research Projects Agency (DARPA) laid down a challenge to scientists: find a way to use electric fields or sonic waves to suppress fire *instantly*. "Fire, especially in enclosed military environments such as ship holds, aircraft cockpits, and ground vehicles, continues to be a major cause of material destruction and loss of warfighter life," noted the agency in its announcement. This spring, scientists in the lab of Flowers University Professor George Whitesides succeeded in extinguishing a flame a foot and a half high with a strong electric field.

A flame, explains Ludovico Cardemartiri, the postdoctoral fellow who ran the experiments, is really a chemical reaction in which part of the combustible fuel source is being ionized—separated into positively and negatively charged particles that form a gas cloud of charged particles called a plasma. That much has been known for a long time, and scientists have even used static electric fields to "bend" flames.

The Whitesides team found that by using an oscillating electric field (of the kind generated by alternating current), rather than a static field, the flame could actually be snuffed out. Because a flame is a complex system, composed of myriad dynamic parts, Cardemartiri explains, scientists still don't have a complete quantitative understanding of this process. But they think that the soot in the flame might play an important role, by concentrating the positively charged ions in the plasma; when a high-voltage electric field emanating from the tip of a wire is pointed at the flame, it exerts a repelling force on the charged particles, which drag the plasma with it. Pushed off its fuel source, the flame dies.

Whether this discovery will yield fire-suppression technologies of the kind that DARPA hopes for remains to be seen. Nevertheless, Cardemartiri points out that this kind of basic research, which has yielded new insight into how electrical waves can control flames, could have an impact on other important applications of combustion—perhaps even in cars or power plants.

—JONATHAN SHAW

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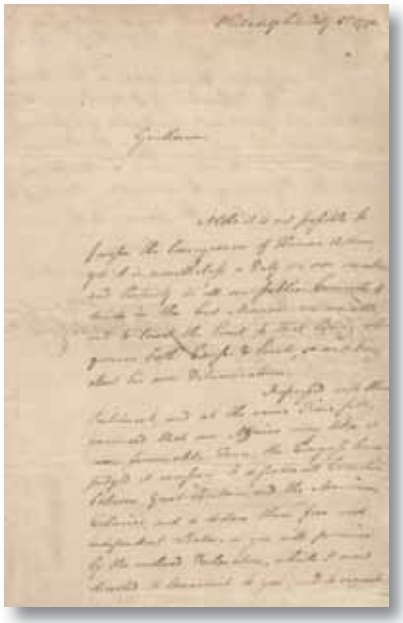
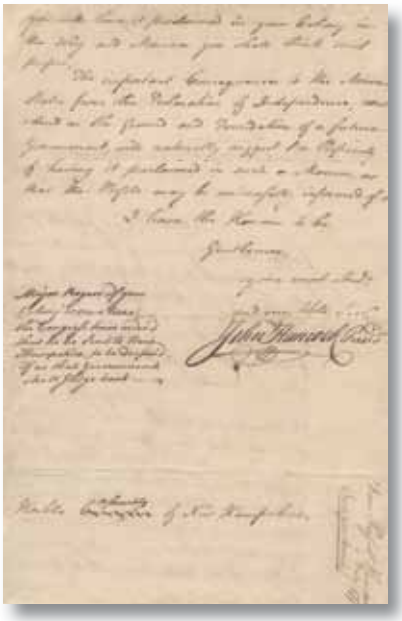
George Whitesides and colleagues have discovered that they can extinguish a flame by pushing it off its fuel source, using an electric field that emanates from the tip of a wire.

Photograph courtesy of George Whitesides

OWN A PIECE OF HISTORY





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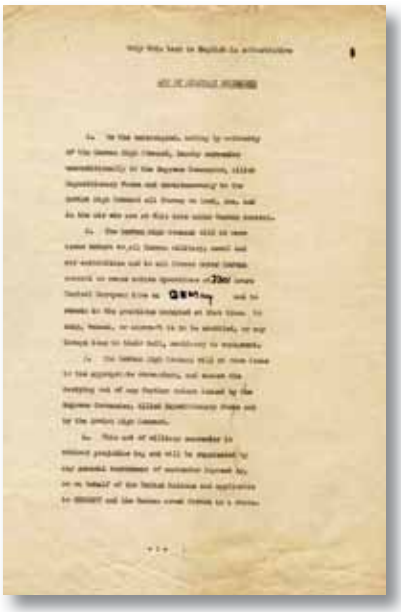

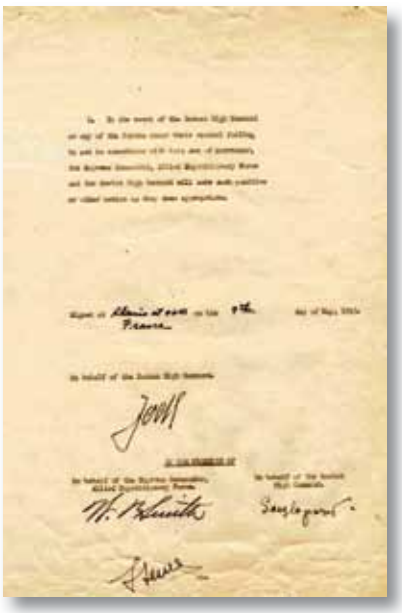

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