

DEATH

TYLER VOLK

DORION SAGAN

See

DEATH & SEX

Tyler Volk & Dorion Sagan



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Two books under one cover deliver a brief, incisive, and entertaining romp through the science of sex and death.

On DEATH . . .

What does death have to do with life? In his short, intriguing look at how and why things die, Tyler Volk explains that death is not simply the end of life. Rather, it is an essential step in natural selection that has long powered evolutionary design. Volk weaves the science of living and dying in a deft narrative that illustrates how life uses death for more adaptive living. In fact, death has been an exquisite, ever-shifting part of the grand evolutionary story—from life's simple beginnings nearly four billion years ago to the evolved human culture and consciousness of today; from the simplicity of bacteria to the complexity of human psychology. *Death* reveals the connections between life and death, not as opposites, not even as complements. Volk illuminates death as an organ of life—rather like wings or fingers, mating behaviors, or thoughts.

. . . and SEX

In *Sex*, Dorion Sagan takes a delightful, irreverent, and informative gambol through the science, philosophy, and literature of humanity's most obsessive subject. Have you ever wondered what the promiscuous behaviors of chimpanzees and the sexual bullying of gorillas tell us about ourselves? Why we lost our hair? What amoebas have to do with desire? Linking evolutionary biology to popular culture, *Sex* touches on topics ranging from animal genitalia to sperm competition, jealousy's status as an aphrodisiac, the origins of language, Casanova and music, ovulation and clothes, mother-in-law jokes and alpha females, love and loneliness. A brief, wonderfully entertaining, highly literate foray into the origins and evolution of sex.

Two books in one cover, *Death & Sex* unravel and answer some of life's most fundamental questions.

Since the earliest days of human evolution, two facts of life have dominated our thoughts, fears, and dreams . . .

Two revealing books bound into one seductive, tactile volume, *Death & Sex* can be read from either front cover—as with the cycle of life itself, there is no end, only a new and evolving beginning. From the prose inside to the foil-stamped and embossed boards outside, *Death & Sex* is a sensory treat for all book lovers.

DEATH | TYLER VOLK

“Tyler Volk is a wonderful expositor who tells is like it is.”

—ROALD HOFFMANN, Department of
Chemistry, Cornell University, winner of
the Nobel Prize in Chemistry

In his lucid and concise exploration of how and why things die, Tyler Volk explains the intriguing ways creatures—including ourselves—use death to actually enhance life. Volk weaves together autobiography, biology, Earth history, and results of fascinating studies that show how thoughts of our own mortality affect our everyday lives, to prove how an understanding of what some have called the ultimate taboo can enrich the celebration of life.

TYLER VOLK is the head of the science track in New York University’s environmental studies program and a professor of biology. Recipient of the All-University Distinguished Teaching Award, Volk’s previous books include *CO₂ Rising: The World’s Greatest Environmental Challenge*; *Metapatterns: Across Space, Time, and Mind*; and *Gaia’s Body: Toward a Physiology of Earth*.

DEATH

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TYLER VOLK

CHELSEA GREEN PUBLISHING COMPANY
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To the memory of

JOSEPH VOLK
(d. June 2007)

RHODA AMON
(d. October 2008)

ORREN CHAMPER
(d. December 2008)

JOHN RICHARDS
(d. December 2008)

and to all those living who loved them.

All individual things pass away.
Seek your liberation with diligence.
—BUDDHA (sixth–fifth centuries BCE),
upon his deathbed

If you should have the desire to study Zen under a teacher and see into your own nature, you should first investigate the word shi [death]. If you want to know how to investigate this word, then at all times while walking, standing, sitting, or reclining, without despising activity, without being caught up in quietude, merely investigate the koan: “After you are dead and cremated, where has the main character [chief actor] gone?” Then in a night or two or at most a few days, you will obtain the decisive and ultimate joy.

—Japanese Zen Master HAKUIN (1686–1769)

Six times now I have looked death in the face. And six times Death has averted his gaze and let me pass. Eventually, of course, Death will claim me—as he does each of us. It’s only a question of when. And how.

I’ve learned much from our confrontations—especially about the beauty and sweet poignancy of life, about the preciousness of friends and family, and about the transforming power of love. In fact, almost dying is such a positive, character-building experience that I’d recommend it to everybody—except, of course, for the irreducible and essential element of risk.

—Scientist and author CARL SAGAN (1934–1996)

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PART ONE

Connectivity

Impermanence

Is this what it's like to die?" I wondered. "Perhaps I really *am* dying."

During the winter of 1996–1997, I had moved from New York City to a secluded place where I could concentrate on writing. The book in progress was about life and Earth, so a trailer perched a mile up in the mountains of a spectacular and remote corner of New Mexico seemed ideal. But the metal container nearly became my coffin.

The first signs seemed innocuous. The tip of my right thumb went numb. Then at odd moments electrical zings began shooting along my arm. A few weeks later I started waking at night with painful cramps in one hand or the other. Once I was jolted awake to find my toes in contorted positions and half my face feeling like a wooden mask. Next, my hands and feet started "falling asleep" in the middle of the day and would not wake.

Medical care was a problem. My regular New York doctor was thousands of miles away. The nearest town was across two mountain ranges, and its sole neurologist flew in but once a week, weather permitting. So initially I hoped that my troubles would just go away on their own. Then I happened upon what I thought must be the ultimate cause of my infirmities: poisoning from carbon monoxide, emitted from a wall-mounted propane oven that had been activated just that winter after years of disuse. With the help of a meter I purchased, I discovered that airborne molecules of the odorless, invisible,

deadly gas had at times been accumulating halfway to levels that could cause death in four hours. While writing about the atmosphere's CO₂, I ironically had been oblivious to my growing exposure to a related airborne gas whose biochemical lethality derived from one less oxygen atom.

I immediately shut down the oven, of course. Yet even so, to my horror I kept having what my neurologist over the phone termed "relapses." I grew more and more terrified as these "relapses" intensified. Soon I was barely able to write legibly. At night I found my mind trapped uncontrollably in inane obsessions. I imagined myself, for example, peeling an apple for hours, unable to cease or think of anything else. Coordination faltering, I had to steady myself when walking, one small step at a time. My chest would sporadically become the radiating center of body-filling pulsations, an uncontrollable drumming of rapid-fire vibratos that coursed along my arms and legs. Heartbeats pounded in my ears and set off reverberations all along my nerves.

Fearing that I could be fatally ill, I took to the outdoors and tried to make peace with myself during slow, clumsy walks in the valley that sheltered the trailer. On one cold, evening amble, with snow glossing the juniper trees and the shadows thickening, I relived my childhood and the ensuing pageant of my then forty-six years, trying to come to terms with my inner terror and the realization that, no matter what was going on, no guarantees had ever been given that I'd live to the standard life expectancy.

Over the following month I suffered several more "relapses," and my despair increased. Then one morning I startled myself with a new possibility: Could it be the old car?

I put the carbon monoxide meter in the front passenger's seat, started the engine, turned on the heating fan, and watched safely from the outside as the numbers surged into the danger zone. An exhaust leak! With every four-hour round trip to town I had been dosing myself with a second, indepen-

dent source of carbon monoxide. I had come to the mountains for fresh air, but had found myself being poisoned twice over by defective technologies.

For more than a decade afterward I had to take an anticonvulsant drug to soothe what the doctors called “sensory distortions.” Eventually I was able to wean myself from the medicine, apparently healed. But my outlook on life had permanently shifted.

During the time of terror, during the evening walks, I found myself taking refuge, even embracing, a deep core of gratitude. How marvelous to have lived at all, I felt. Had the carbon atoms of my body been locked into, say, the calcium carbonate crystals of limestone rock, then the atomic arrangements would have had more permanence. In that case, what about an “I”? The transient configuring of carbon in my body allows a conscious self to exist: complicated and conflicted, to be sure, yet also joyous, curious, and loving.

Sure, death would come. Death, I came to realize, was inherent both in my humanness and in the evolutionary nature of our existence. Life and death were totally intertwined. Life, a flowering of the fortunate way my atoms were combined, was bound up with inevitable death. In fact, death made life possible.

I have written this book not to instruct on how to reform and live right, however. Instead, I aim to explore how intertwined death is with life at every scale of our biology, our evolution, and our experience. I am not a healer or a public health worker, a hospice helper or a spiritual teacher. I am a natural scientist, a professional student of Earth’s carbon cycle and lover of the patterns of all systems, from atoms to cognition.

The universe is an enormous field for any number of journeys into the dynamics of existence. Everywhere, at every scale from matter to mind, life and death appear woven together. Knowledge of these weavings, I believe, can nurture and deepen our daily lived experience of being.

Two revealing books bound into one seductive, tactile volume, *Death & Sex* can be read from either front cover—as with the cycle of life itself, there is no end, only a new and evolving beginning. From the prose inside to the foil-stamped and embossed boards outside, *Death & Sex* is a sensory treat for all book lovers.

In the printed book, the two books will not share the same orientation. They will be upside down and back-to-back. We have orientated both books the same in this preview for easier reading.

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Sex | DORION SAGAN

“This admiring reader of Lewis Thomas, Carl Sagan, and Stephen Jay Gould has seldom, if ever, seen such a luminous prose style [as in Dorion Sagan’s work].”

—MELVIN KONNER, *New York Times Book Review*

In *Sex*, Dorion Sagan takes a delightful, irreverent, and informative romp through the science, philosophy, and literature of humanity’s most obsessive subject. Linking evolutionary biology to salacious readings of the lives and thoughts of such notables as the Marquis de Sade and Simone de Beauvoir, *Sex* touches on a potpourri of interrelated topics ranging from animal genitalia to sperm competition, from the difference between nakedness and nudity to the origins of language, from ovulation to love and loneliness.

DORION SAGAN is author of numerous articles and twenty-three books translated into eleven languages, including *Notes from the Holocene: A Brief History of the Future* and *Into the Cool*, coauthored with Eric D. Schneider. His writings have appeared in *The New York Times*, *Wired*, *Skeptical Inquirer*, *Smithsonian*, *Cabinet*, *Co-Evolution Quarterly*, *Times Higher Education*, *Natural History*, and *Tricycle*, among many others.

Sex

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DORION SAGAN

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LORD DARLINGTON: I couldn't help it.
I can resist everything except temptation.

—OSCAR WILDE, *Lady Windermere's Fan*

I am as pure as the driven slush.

—TALLULAH BANKHEAD (1902–1968)

*Nothing in the world is single;
All things by a law divine
In another's being mingle—
Why not I with thine?*

*See, the mountains kiss high heaven,
And the waves clasp one another;
No sister flower could be forgiven
If it disdained its brother;
And the sunlight clasps the earth,
And the moonbeams kiss the sea;—
What are all these kissings worth,
If thou kiss not me?*

—PERCY BYSSHE SHELLEY,
“Love's Philosophy”

If all the young ladies who attended the Yale prom were
laid end to end, no one would be the least surprised.

—DOROTHY PARKER

How is it that, in the human body, reproduction is the
only function to be performed by an organ of which
an individual carries only one half so that he has to
spend an enormous amount of time and energy to
find another half?

—FRANÇOIS JACOB, *The Possible and the Actual*

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Just yesterday I came out of a coffee shop, walking between a gaggle of giggling girls leaning over a balcony—really the railing of a long wheelchair ramp—and the two boys they were flirting with, seated on benches on the sidewalk below. As I walked between the girls on their impromptu balcony and the boys on the street, I noticed a blue condom in its package on the sidewalk and kicked it without breaking stride. Sure enough, that had been the source of the excitement. I heard more laughter as I kicked it again, less obviously an accident this time, and ignored calls to pick it up. As torn condoms and unplanned children attest, and despite the roadblocks and countermeasures, from contraception to warnings of the dire consequences in store for those who so much as play with themselves or engage in premarital relations, let alone more exotic practices, sex finds a way. It exerts its powerful pull. Gay, straight, bi-, or non-, we are all, even if only mentally, under the influence of this basic biological urge.

Other than making a living, and dying, few subjects wax as huge over the human psyche as sex. Questions of attraction, power, abuse, dating, self-image, family, and the vicarious immortality of having children and grandchildren all hinge upon the sexual relation. The teenager's body morphs like something out of a bad movie, the appearance of new patches of hair both welcome as a badge of burgeoning adulthood and frightening as a reminder of a putative evolutionary

* Also known as "horizontal refreshment," "the four-legged frolic," a "flesh session," "Irish whist," "dropping a load of baby batter," "making the beast with two backs" (Shakespeare), and "doing the wild thing," the sex act reliably spawns a long list of clever euphemisms.

past in which ancestors were as ugly as sin—certainly no one you would want to take home to Mother.

Each of us is different, and that is in part the result of our sexual nature, which ensures that each new being will carry a random hand of genetic cards assembled together from the separate deals of each parent. Although the beautiful models on television may give us unrealistically high expectations of idealized and symmetrical beauty in our fantasized partners, in reality we are glad that each of us is not an identical copy in a cookie-cutter mold off an evolutionary assembly line. They may annoy us no end, in ourselves and others, yet it's the little things, from freckles to the shape of a lip, from a way of speaking to the curve of a hip, or the uniqueness of *his* words or *her* thoughts, that mark the loved one as *our* loved one, as opposed to some random drone. I love *you*, we all say, and sometimes we mean it. Sex produces the differences that we recognize as the one we cherish, the special qualities of the beloved in the eyes of the lover. When we love someone who loves us we want to live; unfortunately, as crimes of passion sometimes brutally attest, the opposite is also true.

Sex incites fantasies and families, delight and despair, despondency and ecstasy, swears and smiles. It is also a whetstone upon which writers have sharpened to a razor's edge the rapiers of their wit. Take Lord Chesterfield who, in the eighteenth century, in his *Letters to His Son on the Art of Becoming a Man of the World and a Gentleman*, cut to the chase in a sentence still not bested: "The expense is damnable, the pleasure momentary and the position ludicrous."

Chesterfield's droll observation highlights some deep truths about our status as living, breeding beings on this planet. The damnable expense—which in Chesterfield's case doubtless refers to the money and time spent in wooing, dating, and engaging in matrimony—applies to all sexually reproductive

organisms. Considering that some organisms can clone themselves—a well-fed ameba simply grows and splits to produce two new amebas—what is the point of mating and dating, finding and grinding? Why all this aggravation to court and couple?

When evolution can take one organism and create two, why make matters more difficult by requiring two organisms to make one?

When we ask, “Why sex?” the answer seems obvious: “To reproduce.”

But the curious mind presses on: “Why reproduce?”

In fact there may be a method to nature’s madness, her wanton expenditure of energy and effort: advantages beyond the obvious fact that there is (as yet) no other viable way to make babies.

Sex and reproduction are not necessarily connected, even though they are strongly linked in our species as well as in most plants and animals. In biological terms, *sexual* reproduction can be defined as “the formation of new individuals from the genes of at least two different sources”—for you, your biological parents. *Simple* reproduction, by contrast, is “an increase in the number of individuals”—but those individuals don’t necessarily have to pick up new genes.

Like most things on this planet, sex started long before we did. Bacteria have been exchanging genes, without needing one another to reproduce, since billions of years before the evolution of plants and animals. If the methane recently reported from Mars turns out to have been produced by bacteria, it could even be that life evolved elsewhere in deep space, and that the methane-producing bacteria, considered among the most anciently evolved life-forms, were even sexually trading genes before the origin of the solar system. Sex, in other words, although of the bacterial kind, might be older than life on Earth! In any case, bacteria were getting it on, trading

DNA, for maybe two thousand million years before the earliest ameba-like cells appeared. It is in these cells—more complex than bacteria—that our kind of sex, called meiotic sex, which usually requires two parents, first evolved.

But swinging bacteria started the party. Genes transfer among them without their having to reproduce. In some cases, one “parent” in an act of bacterial sex is not even alive; it’s simply a raw gene—a DNA molecule in solution. This phenomenon, called the transforming principle, was first demonstrated by British medical officer Frederick Griffin in 1928. Griffin found that even dead bacteria of one strain could pass on their genetic material to live bacteria of another strain, thus transforming their offspring into the strain of the dead bacteria. It was later discovered that the transformation was actually caused by the living bacteria absorbing the DNA of the dead bacteria and using it to replicate. Such necrophilia in reverse, like a corpse impregnating a coroner, is typical of the diverse possibilities of sex in the natural world.

We now know that viral DNA, genetic elements called plasmids, and whole bacteria with an entire set of genes may also serve as “parents” in bacterial sex. This kind of sex is infective, direct; it doesn’t have to wait around for reproduction to transfer genes. (Scientists call it horizontal gene transfer, because the genes move directly from cell to cell—as opposed to vertical transfer, where the genes are handed down only from parent to offspring.) In bacterial sex, an old being becomes new without an increase in the number of individuals: It is sex *without* reproduction. The results of bacterial sex are bacteria with some new genes. Then, when these sexed bacteria reproduce, they pass to their offspring the new abilities or traits conferred by their new genes.

If we had sex like this, a brunette with brown eyes could settle into a Jacuzzi with a blue-eyed redhead and leave with

red hair and blue eyes; what's more, she could pass the new traits on to her children.

Bacterial sex, although it is not needed for reproduction, may play a major role in evolution. Infective viruses, which can pass on bacterial genes, are not always harmful. They sometimes spread useful genes, including resistance to other viruses. Also, by trading genes, bacteria can adapt to environmental change far more rapidly than larger organisms, which must reproduce first. Bacteriologists have compared the worldwide capacity of bacteria for genetic exchange to a planetary intelligence, and to the Internet.

Tantalizing evidence from studies of bacteria exposed to ultraviolet rays suggests that bacterial sex (again, not our sort of two-parent, reproductive sex) evolved in the two billion years before Earth was enveloped in a protective ozone layer. This thin layer of O₃ is thought to have only appeared one to two billion years ago as a by-product of the metabolic process of turquoise-colored bacteria—cyanobacteria—whose energy comes from sunlight. The ozone layer about the Earth today shields life from the vast majority of damaging ultraviolet radiation. Bombard modern bacteria with levels of ultraviolet radiation similar to those before the ozone layer formed, however, and the bacteria disperse bits of naked and protein-coated DNA and RNA into the surrounding medium. In the old, pre-ozone-layer days, more sunlight would have penetrated to spur bacteria to eject their genes, leading to recombination orgies in broad daylight.

The sex that humans and other animals, as well as plants and fungi and some ameba-like organisms, engage in is decidedly different. Bacteria have no nuclei (the dense centers of cells) and no true chromosomes (DNA packaged in protein strands), whereas beings like us, made of larger cells, do. These larger cells, containing nuclei and other complex struc-

tures enclosed in membranes, are called eukaryotic (from the Greek for “nut,” referring to the nucleus). Beings composed of such cells range from single-celled *Paramecium* to Britney Spears, made of trillions of eukaryotic cells. Whereas bacteria can take in anything from a single gene floating loose in the surrounding medium to all of another individual bacterium’s genes, the reproductive sex of cells with nuclei typical of nonbacterial species, including ours, involves the doubling of chromosomes and, usually, the merging of nuclei, one from each of two parents, into one. There are no deadbeat dads among bacteria because they all are single parents, and none uses sex to make a “baby.” In two-parent beings like us, however, the sexually merged nucleus with two sets of chromosomes must get back to its original state (that of the sperm and egg cells) with only one set of chromosomes.

In evolutionary terms, you are a sperm’s or egg’s way of making another sperm or egg, just as a hen is an egg’s way of making another egg or a butterfly is a butterfly’s genes’ way of making more butterfly genes. Sex is, so far, an inescapable part of this cycle. The multiplication of cells in a growing animal reaches a peak and levels off. For more animal lives to continue, the growth cycle must be reset. Sex does the trick. Behind the romance and tears, the love and fears, then, is the romantic irony of a transitory consciousness that can be cavalierly discarded after completion of the reproductive cycle.

The eggs and sperm each have one set of chromosomes, and it is their need to get together, once every generation, that causes boy and girl trouble. While the dying body ultimately perishes, the species form, maintained by erotic urges, continues. Of course, people may have sex for all sorts of reasons—to show love, for pleasure and recreation, to feel power, to bestow themselves as a gift, for exercise, even to get rid of headaches—other than reproduction. Neither condoms nor same-sex dalliances increase the number of people: to the

contrary. But for hundreds of millions of years animal evolution has been linked to sex. To understand it, we must look into what Shakespeare called the “backward abysm” of time. In truth, to understand our sex we must look at other organisms, from the apes whose behaviors illuminate our own to the ameba-like cells in which two-parent sex evolved. Only then can we understand the damnable expense, the fleeting pleasure, and the ludicrous position.

PART ONE

Humans and
Other Chimps

Forbidden Fruit

When I was newly married, driving in Florida after a sparsely attended shotgun wedding (just the two of us and a justice of the peace), a preacher came on the radio. I listened because he was criticizing efforts to understand the evolution of sexuality while I was engaged, as a junior science writer, in writing a book on it (with, of all people, my mother, an evolutionary biologist). Scientists these days are taking it down to ridiculous levels, beyond the level of the flea, he said with scorn in his voice. By God, they were even trying to look to bacteria for answers! Listen, he continued. You don't need to look at the birds and bees, let alone microorganisms, to understand sex. Everything you need to know about the subject is already there, written for you in black and white, in the Bible.

As a northerner in the Bible Belt I was perturbed. *The Origins of Sex: Four Billion Years of Genetic Recombination* had yet to come out. Highly technical, due to be published by Yale University Press, this book, just as the Christian broadcaster warned, took it down to the level of cells. Who was I, a twenty-six-year-old, to have such hubris?

Although I'd never read the Good Book cover-to-cover (I hear there are some bawdy parts), and had been brought up by scientists (astronomer father, chemist stepfather, and biologist mother), I could not help but feel accused by this stranger's sermon. In Genesis, as I understood it, Adam is made by God in his image, Eve is taken from Adam's rib, and they live happily ever after—at least until the Fall. As Jimmy Buffett

sings (which you can also hear driving through Florida), some say a woman is to blame: The fall is Eve's fault, as it is she who let the trickster snake whisper sweet somethings in her ear and yielded to the temptation to munch of the sumptuous fruit of the Tree of Knowledge of Good and Evil upon whose branches he hung. She took her fateful bite, and the rest is history.

Now, in English texts such as the King James translation of the Bible, the fruit she bit is an apple, but some say apricots, pomegranates, figs, or grapes were more likely the fruit of the one tree God prohibited the first couple from eating in Genesis 2:9. According to ethnobotanist R. Gordon Wasson, the "apple" may even have been a white-spotted red mushroom, *Amanita muscaria*, of the sort that the hookah-smoking snail sits upon in *Alice's Adventures in Wonderland*. Forming a symbiotic partnership with the roots of trees, this fungus is a kind of "fruit." It also qualifies as a candidate for the first bite on the grounds of being psychoactive and poisonous, although for sheer salacious lubriciousness in cross section it's hard to top the apple.

Who could blame Eve, surrounded by all those arrogant males, for taking a bite of the forbidden fruit? Even if the main thing learned from that luscious bit of nutriment was the revelation that they were naked. Nonetheless, for her contagious disobedience in partaking of such a licentious snack, God the Father doled out a suitably agricultural punishment: They were to toil with the soil, and grow their own, rather than continuing on as freeloaders in a paradise they didn't appreciate, blithely violating divine edicts, like the prohibition against education.

According to the Bible, this was the female-precipitated ur-disaster for which we continue to pay. There was also said to be a Tree of Life in the Garden that conferred immortality, but God made sure that Adam and Eve, given their sinful natures,

didn't get a piece of that. Instead, they were expelled from the Garden, fell to Earth (or, more allegorically, into incarnation and time), and were subject henceforth to aging and death.

Well, maybe. There does seem to be a connection, and not just in the Bible, between sex and death. The tiny ameoboid microbes that preceded all animals have chromosomes with DNA in the nuclei of their cells. Such cells, bigger than bacteria, don't all mate, but some do. And when they do, parts of the cell of one, the oxygen-using mitochondria, must be "put to death" by the other. When an egg and sperm merge, like a young couple moving into a Manhattan apartment, they can't take everything with them. Some stuff, such as his DNA-containing mitochondria, never make it into the fertilized cell. Of the trillions of cells of our bodies, only a few sperm and eggs survive into the next generation. In coming together in reproductive sex, the sex cells leave male and female bodies behind to grow a fresh being. It is the reproductive cycle, not the individual animal, that is selected for over evolutionary time. After the midair mating of a queen by a horny honeybee, the latter goes *pop*, audibly, as its penis breaks off inside her (blocking passage to other would-be suitors) while the rest of his body plunges to its death. It may seem tragic to have life cut short in such flagrant fashion. But then the honeybee exploding immediately prior to death is lucky relative to his fellows, who can number up to twenty-five thousand, all virgins whose efforts to compete for the queen's sexual favors fail, their entire lives an exercise in frustration.

Evolution travels light. Sex and death do go together, although the colorful stories of Genesis, written more than two thousand years ago, favor the story of a talking serpent over the fact of serpentine DNA, whose structure was deduced only in March 1953. Scientific stories about sex are not necessarily as pretty as Scarlett Johansson, as romantic as a honeymoon on O'ahu, or as memorable as Adam's de-ribbing. But

exploring the evolutionary story of our sexual nature based on science will help us get to the bottom of this topic better than the radio sermonizer's version of religion.

If we are to be punished for Eve's congress with the twisting reptile of the Tree of Knowledge, we should at least relish each morsel of wisdom that her sinking her incisors into the ripened red ovary of the flowering *Malus domestica*—the fruit of the apple tree—has made possible for us.

Sex

DORION SAGAN

TYLER VOKL

DEATH