

PATRICK MADDEN

Finity

Oh, what a brave faculty is hope, which, in a mortal subject and in a moment, usurps infinity, immensity, eternity!

—Montaigne, "Of Names"

GRAPES, APPLES



There are 172 grapes in the bag I bought from my local Smith's supermarket. One-hundred-sixty of them look to be in good shape, four of them are undeveloped, six of them are deflated, and two were hiding underneath the drain in the sink where I washed them yesterday, thus upsetting the nicely round number (a prime number multiplied by ten!)

I thought I had.

So I returned to Smith's to buy another bag of grapes. On the fruit stand just inside the automatic doors, I found only eleven bags of grapes: seven green and four purple. They were on sale for \$1.00 a pound (called "10 for \$10" by the store). I picked the bag that looked healthiest. I noticed nine escaped purple grapes and two escaped green ones on the purple cardboard padding below. To the side, on the next stand, there were ninety-nine small red delicious apples at 79¢ a pound. Beside those there were more than ninety-nine (it was obvious; I chose not to count) golden delicious apples, and even more gala apples, each at 79¢ a pound, too. Next on down the line were eighteen large mangoes (10 for \$10; save 29¢!), then thirty-four large pink grapefruits (99¢ a pound; I picked up two). Around the back, on another stand, there were Jonagold apples, cameo apples, other batches of golden delicious and gala apples, red delicious apples, Braeburn apples, Granny Smith apples, pink lady apples, ambrosia apples. There were five- and ten-pound bags of apples for discounted prices. There were Seneca-brand apple chips. Not far away there were twelve brands of apple juice and cider in bottles (including organic, sparkling, and light varieties). Near those were four brands of apple sauce, some in individual-sized plastic cups, some flavored with strawberry or cinnamon. In

the freezer aisle there were three brands of frozen apple juice, not counting the unnatural pairings (mostly by Old Orchard, which had no solo apple juice) of apple with strawberry and kiwi, passion fruit and mango, cherry, raspberry, cranberry. There were apple pies and Apple Newtons and apple Pop-Tarts and apple Toaster Strudels.

Also, there were twenty-two more bags of grapes in the cooler on the side wall of the produce section: eight green and fourteen purple. There was also the produce guy straightening up the piles of fruits and adding new ones and eyeing me a bit suspiciously as I stood counting grapes and grapefruits and apples, as I jotted down numbers and names on the back of my grocery list. So I left.

When I got home, I counted the grapes I had bought. There were 136, though they were much smaller and sourer than the other grapes. I didn't weigh them, but they seemed to occupy less than half the space the other grapes had occupied in the grape bowl.

These grapes, according to their bag, had traveled all the way from Chile, where it was now summer, to my Smith's supermarket at the crossroads of Main Street and Redwood Road, on the border of Lehi and Saratoga Springs, Utah. Smith's is a Utah grocery store franchise, but it was recently subsumed by Kroger's, an Ohio chain. The Kroger conglomerate owns 2,515 grocery stores in 37 states. All of them sell grapes and apples no matter the season.

PHYSICS, METAPHYSICS

When I was younger, I loved physics. My high school teacher, Mr. Altenderfer, made the world seem magical, yet knowable. His influence led me to finish a bachelor's degree in physics, though I had soured on it by the time I was done. Rarely, during my high school years, did we delve into metaphysics, the reasons why, the unknown realms beyond knowledge. But we thought, as do we all, about the universe and time. When we experimented, we learned that we approximated a closed system, a section of everywhere and everywhen that we could, in some measure, control, or at least fit in our minds. Or so we thought. But the boundaries were flimsy and tempting. First we wondered about influences from outside the system (the experiment), then outside that system (the whole lab or school), then outside that system (the planet), outside that system (the solar system), etc. (the galaxy, visible space, mathematical

models of the universe back to the moment of the Big Bang). The thought experiment was dizzying.

If the universe is everything, and scientists say that the universe is expanding, what is it expanding into?

—Stephen Wright

Soon college brought me advanced physics and late-night conversations with roommates, so I thought, too, of infinite knowledge and time, the paradox of free will, the irresistible force meeting the immovable object, a boulder so large that God cannot lift it, the mystery of prayer. It brought, as Edmund Burke says, a “sort of delightful horror, which is the most genuine effect and truest test of the sublime.”

But I am not thinking, now, of the infinite, only the finite, or perhaps the subsection of the finite that is very large, in number or quantity, those things we must, of necessity, receive piecemeal, “detached and subdivided”: all the grapes in the world, all the grains of sand on the beach, all the stars in the sky, all the people who ever lived.

ABRAHAM’S SEED

After Abram’s nephew Lot moved to Sodom and Abram to Mamre (the town of Bethel wasn’t big enough for the two of them), God said to Abram:

I will make thy seed as the dust of the earth: so that if a man can number the dust of the earth, then shall thy seed also be numbered.

—Genesis 13:16

Later, in a vision, a revision:

Look now toward heaven, and tell the stars, if thou be able to number them: and he said unto him, So shall thy seed be.

—Genesis 15:5

If I’m Abram, I’m thinking, since my wife Sarai is infertile and my only heir nowadays is my steward, Eliezer of Damascus, that this

may be a trick: *If a man can number the dust of the earth? If I be able to number the stars? And if he can't? If I be-n't?*

Yet, as Paul tells us, Abram “against hope believed in hope, that he might become the father of many nations.” Along the way, though, Abram probably thought less and less about the promise, or revised his expectations. He organized a guerrilla force and attacked by night to rescue Lot from Amraphel king of Shinar, Arioch king of Ellasar, Chedorlaomer king of Elam, and Tidal king of nations, who had taken him and his goods captive; he lay with Hagar, Sarai’s Egyptian handmaid, who bore him a son, Ishmael (“a wild man; his hand will be against every man, and every man’s hand against him”); he sealed the deal with God, changing his name to Abraham, getting circumcised at age 99, along with Ishmael, age thirteen, and all the men of his house; he debated with God, trying to save Sodom from destruction, whittling down his request from fifty all the way to ten righteous, instigating that great theological debate, the problem of evil, why does the Lord allow the humble to bear iniquity, why do bad things happen to good people? I like Abraham here in his impertinence:

Shall not the Judge of all the earth do right?
—Genesis 18:25

He’s got him there, so God reneges. Then in unwavering humility, Abraham begins the barter:

Behold now, I have taken upon me to speak unto the Lord, which am but dust and ashes: Peradventure there shall lack five of the fifty righteous: wilt thou destroy all the city for lack of five?
— Genesis 18:27–28

Abraham doesn’t back down, in spite of his tiptoeing. As it was, there were only four righteous there, and maybe not even that many. As chapter 19 opens, we cut scene to Lot’s house in Sodom, where Lot is offering his virgin daughters to appease an angry mob that wants to “know” the two angels staying there; later, as Lot and his family fled, Lot’s wife looked back and became a pillar of salt. A few days later, in a cave near Zoar, his two daughters (who were saved, despite their

father's reckless endangerment) got him drunk and lay with him "that [they might] preserve seed of [their] father."

Back at Mamre, God had renewed the promise with Abraham, saying this time for sure that the line would continue through his wife, now called Sarah. And look: when Sarah heard it, she first responded not with desiccated joy in the continuation of the lineage. No,

Sarah laughed within herself, saying, After I am waxed old shall I have pleasure, my lord being old also?

—Genesis 18:12

The number of stars in the heavens or motes of dust on the earth is, for all intents and purposes, uncountable, incomprehensible. "For all intents and purposes": now there's a phrase I bet most of us got wrong the first few times we heard it (like "supposably" or "all (of) the sudden" or "just assume" or those phrases that have given way to the masses' confusions: "chomping at the bit" for "champing at the bit" or "spitting image" for "spit and image"). For me, and for lots of people, it was "for all intensive purposes." While I am, nowadays, an incorrigible stickler on questions of grammar and usage, I hold a fondness and a potential for "for all intensive purposes," which seems not only more up-to-date, but more, I don't know, *intense*. What power one would wield if one could marshal *all* intensive purposes. It sounds like the plot of a G.I. Joe episode.

In any case, knowing how many stars there are is a divine attribute, not a trait of mere mortals:

He telleth the number of the stars; he calleth them all by their names. Great is our Lord, and of great power: his understanding is infinite.

—Psalms 147:4–5

So...

HOW MANY STARS *are* THERE IN THE UNIVERSE?

Tell a man that there are 400 billion stars and he'll believe you. Tell him a bench has wet paint and he has to touch it.

—Stephen Wright

Wright's funny, but he's not right. He has underestimated by roughly a factor of 10^{12} (so take his 400 billion and *multiply* it by another 400 billion and you're in the right neighborhood). Of course, no one knows exactly how many stars there are in the universe. Where I live, and likely where you live, too, there are only thousands of stars visible to the naked eye. With a basic telescope and some better darkness, you could see millions more. The European Space Agency, which in 2007 launched an infrared space observatory to count galaxies and measure their luminosity (to allow better approximations of—you guessed it—how many stars there are in the universe) estimates that there are between 10^{22} and 10^{24} . The notation does the number an injustice. There it is, so compact that it fits in a space on the page smaller than your pinkie fingernail. And yet it is a number beyond imagining.

There is no way that Abraham could have that many descendants. According to calculations by Carl Haub of the Population Reference Bureau (prb.org), assuming that the first humans set foot on earth about 50,000 years ago, and “guesstimating” (his word) population sizes, birth rates, and life expectancies through the ages, there have been 106,456,367,669 people born on earth in all of history. That's just over 10^{11} , with a few billion of those people living before Abraham (scholars estimate that he lived more or less around 2000 BC). So, even if somehow everybody on earth today were descended from Abraham, you'd still have to multiply everybody who's ever lived by everybody who's ever lived (I can't fit this into my mind, can you?) to get anywhere close to the number of stars in the universe.

And, mathematically, everybody on earth *could* be descended from Abraham. First of all, even though God's promise was extended through Isaac, Sarah's son, Abraham had a total of eight sons. Ishmael and Isaac were the first two, but after Sarah died, Abraham married Keturah, who bore him Zimran, Jokshan, Medan, Midian, Ishbak, and Shuah. Ishmael had twelve sons, and although Isaac only had two (Esau and Jacob, later called Israel), Israel had twelve sons. The Bible record is very scant on how many daughters each of these patriarchs had, though daughters are mentioned. So they got a good start on populating the whole world, and despite the older brothers' attempts to get rid of Joseph, all twelve of Abraham's great-grandsons through the promised line survived well into adult-

hood, so it's even mathematically possible that we might all be descended from Sarah.

Here's how it would work: We assume that Abraham lived four thousand years ago. It doesn't matter much how many people were alive then, but let's say it was twenty million. One generation after Abraham, there are at least eight people with Abraham's genes. One generation after that there are at least fourteen, and likely thirty-two or more. Next generation, it's something like sixty-four. Even if everybody slows down, a few great-grandchildren never marry, others marry their own relatives, a few get killed in battle, etc., Abraham's descendants are becoming a greater percentage of the population, even as the whole population grows. (This is not a takeover; their Abrahamic genes are becoming less prominent, too, mixed with the genes of others.) Estimating conservatively, within fifty generations, everyone on earth can be descended from Abraham.

If this sounds unlikely, it's because human beings are willful, passionate creatures, marrying for alliances and common beliefs; we're not loose molecules cast about by natural forces. Abraham's descendants may not have moved to every part of the world; they may have decided to marry their own (the Bible tells us as much); they may have been shunned and persecuted and systematically killed, thus keeping them from intermarrying with other groups of people.

If I may briefly attend to a common objection I've encountered, from bright people no less: In response to my claim that we may all be descendants of Abraham, they've "corrected" me with "You're assuming Abraham was the only one having children back then." Not at all. The fact is, we might all be descendants of *everybody* who lived four thousand years ago. Heck, if you traipse mathematically *backward* along your family tree, you'll find that you could have had 10^{60} forebears two hundred generations ago (Abraham's time). All indications tell us that that's fifty-two orders of magnitude more than the total number of people alive then, and it's forty-nine orders of magnitude more than Haub's estimate for all the people who have *ever* lived. We each have two parents and four grandparents and eight great-grandparents, and so on, but somewhere back there, people must start marrying relatives (close or distant) and causing significant overlap in their great-great-great-greats. Sometimes it happens close up: for instance, one pair of my wife's grandparents were cousins, which gives her only fourteen great-great-grandpar-

ents while I have sixteen. If there are no other close relatives who married, then Karina has twenty-eight great-great-great grandparents to my thirty-two, fifty-six four-greats to my sixty-four, and so on. And the neat mathematics of it all can get mighty complicated with second marriages or unmarried pregnancies or incests or any number of sexual variations.

Nevertheless, even if all of the people in the world today *were* somehow descended from Abraham, and even if we all have been for several generations, you're still ridiculously far from the number of stars in the universe. So maybe, one thinks, God was referring to the visible stars, which numbered, back in the day, with essentially no light pollution but without telescopes, as long as you took a few steps away from the fire, only in the tens-of-thousands range. Abraham probably achieved that within three hundred years, even if you stick to just Sarah's descendants.

Which might be all right, except for the problematic dust promise, and the next iteration of the metaphor, after Abraham's trial, Isaac's near-sacrifice:



By myself have I sworn, saith the LORD,
for because thou hast done this thing,
and hast not withheld thy son, thine only
son: That in blessing I will bless thee, and
in multiplying I will multiply thy seed as
the stars of the heaven, and as the sand
which is upon the sea shore; And in thy
seed shall all the nations of the earth be
blessed;

—Genesis 22:16, 17

"The sand which is upon the sea shore," eh? By the way, why is it impossible to starve in the desert? Because of all the *sand which* is there. (I am a martinet even for *that* and *which*, restrictive and nonrestrictive clauses, but when the King James translators choose to misuse *which*, it is not overcorrection or affectation; it is a setup for a joke).

ARCHIMEDES' *Sand Reckoner*

Notice that God did not challenge anybody to *count* grains of sand, but Pindar, the Greek lyric poet laureate of the Olympics, did, at least indirectly:

The sand escapes numbering

- or -

None can count the ocean's sand

- or -

Go, count each sand-grain on the storm-swept beach

—"Olympian Ode 2" (depending on your translation)

One gets the idea that this was a common expression of vastness, meant to cast the mind to awe, to humble the hearer. In fact, similar phrases alluding to the innumerability of sand appear in Aristophanes' play *The Archanians* and in the *Iliad*. But Archimedes, the Syracusan philosopher, mathematician, geometrician, etc., didn't buy it. He knew a good challenge when he saw one, so he decided that you *could* number all the sand. This is the same man who supposedly ran naked through the streets shouting "Eureka!" after discovering that he displaced water equal to his body's volume. Thus he could test whether King Hiero's new crown was made



of pure gold or if it was adulterated with less-dense silver (as was the case, apparently). This story, apocryphal or not (it comes to us through Vitruvius' *De Architectura*, written in Rome circa 27 BC, at least two centuries after it would have happened), is yet one more example of the subconscious mind working overtime, grasping at everything within its reach and experience, finding answers or connections in unexpected places, when weighted by a ponderous ponderance.

Regarding sand, though, Archimedes set out not to count but to calculate. First, he established estimates for the size of the earth (he erred by a factor of ten too big) and, then—figuring, perhaps, *why not?*—for the size of the universe, which was not far off from the currently accepted size of our solar system. Next, because the numerical system currently at his disposal—which reached its upper limit at a *myriad*, or 10,000—was insufficient for his calculations, he devised an exponential system (along the way discovering and proving that $10^a \times 10^b = 10^{a+b}$) that allowed him to notate ridiculously large numbers. Next he calculated how many grains of sand were equivalent to a poppy seed, then how many poppy seeds fit into a 1-inch sphere, then how many fit into the universe. Given lots of room for errors of supposition (but not calculation), he determined that a sand-filled universe would contain approximately 10^{63} grains. He ended his explanation with this disclaimer:

To the many who have not also had a share of mathematics I suppose that these will not appear readily believable, but to those who have partaken of them and have thought deeply about the distances and sizes of the earth and sun and moon and the whole world this will be believable on the basis of demonstration.

Revising Archimedes' suppositions a bit, and approximating a lot of numbers, my father and I came up with a slightly more reasonable approximation for the number of grains of sand actually on the earth. Say that the earth is 25% land, and 1% of that land is sand to a depth of 10 feet. Each grain of sand is about 0.1 millimeters in diameter. Then you'd get about 1.5×10^{22} grains. If you don't believe that, John Lamb, a chemistry professor at Brigham Young University, had done his own calculations a few years back in preparation for a university devotional speech, and he sent me his scratch

sheet. He may be more exact on his weights. Ten milliliters of sand, by his measurements, weigh 15.7715 grams, and thirty grains of sand weigh 0.00836 grams. This gives 56,590 grains in the ten ml. Lamb assumes 10^6 km of beach on earth at an average ten meters width and one meter depth, which gives 5×10^{19} grains of sand on earth. That's almost five hundred times less than my father and I calculated, but either way, it's still too many descendants for Abraham.

This is all well and good, but to the mind, it really doesn't matter much if the exponent above and behind the ten is 19 or 22 or 63 (though the latter is, in reality, *vastly* preponderant). The problem, it seems to me, is not so much a matter of the numbers on paper or the notation, but of conception, or of the logistics of real counting. My six-year-old daughter understands, fascinated, that counting is logical and additive, simply a matter of fitting a recursive linguistic pattern. But she gets tired soon after one hundred, and her mind wanders, and she decides she really doesn't want to count to two hundred or a million or fifty hundred thousand.

And realistically, much of the time when we're saying *infinite* what we really mean is "too big to count."

There are scarce any things which can become the objects of our senses, that are really and in their own nature infinite.

—Edmund Burke, *On the Sublime and Beautiful*

Still, the finite-but-extremely-vast is as fascinating, as dizzying, as discombobulating as any supposed infinite thing. Most of the time, I take a deep and perverse kind of pleasure from thinking on the superfinite, trying to fit it in my mind as I close my eyes and let my fingers find the keys they know are beneath them, crafting words to give voice to impossible ideas that we've tamed by reducing them to figures, other symbols, like words, meant to encapsulate some essence, some idea in easily portable, transferable packets of *meaning*. At other times, the mental exercise can be downright discouraging, the sheer innumerability of things becoming a weight on the soul, a snuffer leading to a sort of existential despair. What hope can there be under the barrage of uncontrollable things? What exit can we slip through when the numbers begin piling up, unaccountably, uncountably, demanding attention or comprehension? Indeed, the

vertigo of numbered things can be such that one begins to wonder if any thing is truly infinite. Perhaps only ideas.

But if there is one infinite thing, you might think it's Apollo's herd of sun cattle. No one would blame you for such an assumption. But again, Archimedes would be there to prove you and the scholars of the Library of Alexandria wrong with one of the most complex computational arithmetic problems ever devised. It reads like a GRE analytical problem written by a mathematician on the verge of breakdown:

If thou art diligent and wise, O stranger, compute the number of cattle of the Sun, who once upon a time grazed on the fields of the Thrinacian isle of Sicily, divided into four herds of different colours, one milk white, another a glossy black, a third yellow, and the last dappled. In each herd were bulls, mighty in number according to these proportions: Understand, stranger, that the white bulls were equal to a half and a third of the black together with the whole of the yellow, while the black were equal to the fourth part of the dappled and a fifth, together with, once more, the whole of the yellow. Observe further that the remaining bulls, the dappled, were equal to a sixth part of the white and a seventh, together with all of the yellow. These were the proportions of the cows: The white were precisely equal to the third part and a fourth of the whole herd of the black; while the black were equal to the fourth part once more of the dappled and with it a fifth part, when all, including the bulls, went to pasture together. Now the dappled in four parts were equal in number to a fifth part and a sixth of the yellow herd. Finally the yellow were in number equal to a sixth part and a seventh of the white herd. If thou canst accurately tell, O stranger, the number of cattle of the Sun, giving separately the number of well-fed bulls and again the number of females according to each colour, thou wouldst not be called unskilled or ignorant of numbers, but not yet shalt thou be numbered among the wise.

But come, understand also all these conditions regarding the cattle of the Sun. When the white bulls mingled their number with the black, they stood firm, equal in depth and breadth, and the plains of Thrinacia, stretching far in all ways, were filled with their multitude. Again, when the yellow and the dappled bulls were gathered into one herd they stood in such a manner that their

number, beginning from one, grew slowly greater till it completed a triangular figure, there being no bulls of other colours in their midst nor none of them lacking. If thou art able, O stranger, to find out all these things and gather them together in your mind, giving all the relations, thou shalt depart crowned with glory and knowing that thou hast been adjudged perfect in this species of wisdom.

If you just skimmed over those last two quoted paragraphs, that's fine; you've demonstrated what I'm talking about: our inability to sort through so much information, our incapacity to parse such complex interrelations.

The solution to the first part of the problem is 50,389,082 (according to Drexel mathematics professor emeritus Chris Rorres), but to be numbered among the wise, one must also solve the second part. From 1889 to 1893, the three members of the Hillsboro (Illinois) Mathematical Club, following the 1880 work of one A. Amthor, worked out the first 31 digits (though they were wrong on the last two) and the last 12 digits of the solution. In 1965, researchers at the University of Waterloo, in Canada, needed nearly eight hours of number-crunching computer time to determine all 206,545 digits of the solution, which can be expressed approximately as $7.760271 \times 10^{206544}$ and which can be calculated in barely a couple of seconds on today's home computers.

Still, Archimedes claims that for you to be adjudged perfect in this species of wisdom, you must "gather [all these things] together in your mind," and I don't think anyone can do that.

JAMES BURKE, NEURAL CONNECTIONS

OK, theoretically, it *may* be possible. In his recent talk at Brigham Young University, James Burke, author and host of the BBC program *Connections*, predictably decried the limitations that result from the inherent exclusions of academia, pointing out that, given each person's 100 billion neurons, there are more ways a message can go through the brain than there are atoms in the universe. There are more pathways to connection than there are physical things to connect.

Burke also argued against the compartmentalization of academic studies, the Cartesian reduction of the whole into manageable sys-

tems. Similarly, or asymptotically, Gary Saul Morson, in his treatment of Lao Tzu, expresses the impossibilities of a closed system:

The very fact that we are in the world...makes it impossible to understand it. We are trapped at a moment of time so we cannot see the world from the perspective of eternity. We are entangled by language, by the very categories of thought.

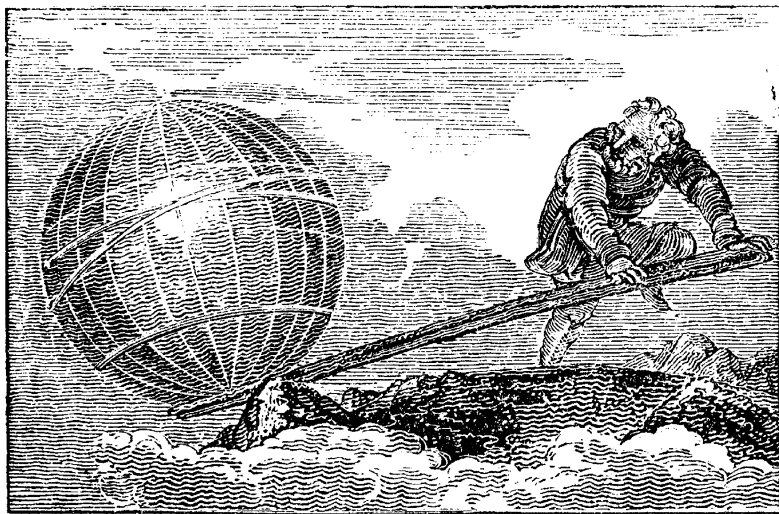
—"The Aphorism: Fragments from the Breakdown of Reason"

Perhaps we are summoning (again) Archimedes, who claimed that he could move the earth if he but had a place to stand on. Or we are echoing Herman Dooyeweerd, the twentieth-century Dutch philosopher, who posited (if not originated) the metaphorical concept of an "Archimedean point" outside the system from which to understand the totality of philosophical or theological meaning. Yet the theory has no place in reality. It is a hazy, impossible concept, and perhaps not even a desirable one. This, it seems vibrantly clear to me, is why we essay, why I want to be a polymath examiner-of-the-world, a thinker (and doesn't everybody?). This is also why I laugh at our characterizations of the great thinkers who came before. We break Archimedes into his components as suits our needs: mathematician, physicist, engineer, astronomer, philosopher. That last label might fit best: a lover of wisdom and knowledge.

GENGHIS KHAN, NIALL NOIGÍALLACH, BRIGHAM YOUNG

Speaking of lovers, return with me, if you will, to our consideration of progeny. As the ninth of eleven children, Brigham Young, whose name my university bears, was no stranger to large families. Contemporary reports assure us that he was reluctant to practice polygamy when the doctrine was announced by Joseph Smith, but you could say he made the most of it when he finally decided to go along (his first wife, Miriam Work, had died in 1833, before Young married his second wife, Mary Angell, the following year, and then, beginning in 1842, many other women).

It is a bit difficult to figure out how many children Brigham Young had. Even Latter-day Saint church historians seem not to know, though all the ones I talked to figure it's a very big number. Several websites and at least one official church book give the number of children as 57, by sixteen of his wives



(another difficult statistic to gather; it is likely that he married as many as sixty-one women). The Brigham Young Family Association was unresponsive to my queries. But let's say that Brigham Young has thousands, nearing tens of thousands, of descendants nowadays. The association website lists over 2,000 surnames of his descendants, many of them shared by several people. For instance, there are 808 Youngs, and they don't even list Brother Brigham's most athletic left-handed heir, NFL Hall-of-Famer Steve Young.

If you've been curious about such things, as I have been lately, you might have heard about the numerous modern-day progeny of Niall Noigíallach, a.k.a. Niall of the Nine Hostages, a fifth-century Irish king, sometimes dismissed as simply legendary, sometimes credited with kidnapping the British teenager with the charming name who would return a score of years later to drive out the snakes and convert the pagan Irish to Christianity through his clever trefoiled metaphor. In 2006, Daniel Bradley and a team of geneticists at Trinity College discovered a "distinctive genetic signature" on the Y chromosomes (which are passed from father to son) of twenty percent of men in northwestern Ireland (and two percent of men in New York City). This, Bradley concludes, points to some common ancestor, who might just as well be Niall (the chromosome abnormality is common among those whose families claim descendancy from him), who gained his nickname when he consolidated his realm by taking nine hostages from local royal families.

In any case, *some* ancient Irish man with the wherewithal to spread the fruits of his loins far and wide has approximately three million male descendants today, putting him second (so far) to Genghis Khan, who, despite his much later start (the thirteenth century), is believed to be the progenitor of approximately sixteen million men today, roughly one-half of one percent of the world's current population. Granted, this is all conjecture, since neither Niall nor Genghis is available to give a DNA sample. But given the Khans' prolific procreative practices, and the strange coincidence that an isolated group of Genghis-descended Pakistanis displays the same genetic mutation found in eight percent of the Mongolian population, scientists (and I) believe it very likely that Genghis Khan is the man. No word on whether his cheery disposition has also survived intact.

CHILDREN, POPULATION

I believe the children are our future.

—Whitney Houston, "Greatest Love of All"

Karina and I have four children. This, in the grand scope of things, is not entirely strange or out of sorts. Both Karina and I come from four-children families. My father, too. Her father's family included eight children. (Our mothers are both only children, but didn't like growing up without siblings.) One problem, though, in a cold-hearted zero-sum view of resource management, is that we are healthy and relatively wealthy, thus our four children are still alive and can be expected to live well into adulthood. They, like we, consume more than their fair share of the earth's bounty, even, apparently, when we lived in a small house in Uruguay recently, didn't own a car, rode bicycles and walked (or rode buses to travel long distances), bought almost entirely local produce, rarely ate processed, preservative-laden foods (they were too expensive), recycled much of our trash, etc. According to <http://myfootprint.org>, we'd still need 2.2 planets for everyone to live like my family did in Uruguay. And the fact is, we're no longer living there, we're living in Utah, where water is dammed and apportioned, where victuals are imported, and where so many people drive cars up and

down the valley that in winter, exhaust is trapped between mountains in an unhealthy “inversion.”

Many of my friends who received the news of our fourth child’s birth recently have responded with some version of “whoa!” in both of its senses. Mark Halliday, who feels strongly about such things, once wrote a poem called “Population,” which goes, in part:

we can make babies galore, baby:
let’s get on with it. Climb aboard.
Let’s be affirmative here, let’s be pro-life for God’s sake
how can life be wrong?

...

If you have ten kids they’ll be so sweet—
ten really sweet kids! Have twelve!
What if there were 48 pro baseball teams,
you could see a damn lot more games!

He’s made his point on the page, so he doesn’t really need to confront people about it, but he does, though in slightly more tactful terms. When Karina and I were expecting our third child, he said, “You know, now they’re going to outnumber you.” Mark has two kids, though with two different wives, which can be better or worse, depending on your views. In his view, that’s two new people out of three existing ones, which is a step in the right direction. In fact, he says, he’s “taken one other guy out of commission”: his son’s stepfather, who has no children of his own, so even better. When we’d had number four, he expressed his condolences, then, during our farewell niceties (he had come to visit BYU) slipped in, “Now, if you email to tell me about child number five, I’m going to have you committed” or some such revealing threat veiled in humor. I told him not to worry, though, of course, he’s already been worrying.

According to the CIA, which keeps an online Fact Book on every country in the world, as well as a page on “The World,” there were 6,602,224,175 people as of July 2007. Every year, global population is growing by 1.167%, meaning that by July 2008, there’ll be 6,679,272,131 of us. Not so long ago, in 1820, earth had only about one billion human inhabitants. By 1930, when my grandfather was a young man, that number had doubled. By 1960, when my father was a high school junior, it was three billion. By my junior year, 1988,

we'd reached five billion. We passed the six-billion mark in 2000, when my son was two. By the time he's a junior in college, we're looking at 7.2 billion.

Students of natural law hold that the birth, nourishment, and growth of each thing is the alteration and corruption of another.

—Montaigne, "One man's profit is another man's harm"

Eduardo Galeano, who writes exuberantly against United States imperialism and resource-hogging, but whom I don't know quite as well as Halliday, and who therefore buries his spoken opinions deeper, expressed his surprise when I told him we had four children (we'd had only two the last time we met), then turned philosophical: "Your wife must be a very strong woman. There are certain things only a mother can do, no matter how theoretically feminist a man pretends to be." His daughter, a lawyer, has three children of her own. He doesn't know how she manages.

Even complete strangers, in Uruguay at least, offer their guidance, in the metaphorical language of a dead-end economy (which may drive the message home more soundly). The guy my father-in-law hired to drive us home from the airport across town: "It's time to close the factory." The taxi driver who took us from Montevideo to the beach-town Atlantida: "The factory's supply is outstripping demand." The two guys at the street bazaar who sold me a decorative hanging lamp made out of an old wagon wheel: "That factory's time has come." I'm varying their sayings here, for literary purposes—call it creative license in translation—but really they had the same exact line rehearsed: "It's time to close the factory."

Who is to blame in one country?

Never can get to the one

Dealing in multiplication

And we still can't feed everyone.

—Eddy Grant, "Electric Avenue"

It is small talk now, unintended and unimportant, the kind of harmless banter that means nothing, yet it is strange to me, this advising, which constitutes a meddling in the most private and most sacred part of a person's life: not only sex, but procreation.

My friend John Bennion tells how he once met an acquaintance in the hallway at the University of Houston who, asking about John's wife's fifth pregnancy, said "You do know why this happens, don't you?" John tells the story deadpan, without a clue to the motives or the seriousness of the inquisitor.

FORBIDDEN FRUIT

The Bible never specifies what fruit it was that Adam and Eve, tempted by the serpent, partook of. Some Jewish scholars believe it was a pomegranate or grapes; Muslim tradition holds that it was a banana. But for Christians, thanks to artists' renderings, perhaps first in Hugo van der Goes's 1470 *The Fall of Man*, today "forbidden fruit," where I live, and likely where you live, too, is almost always synonymous with "apple."

It is also almost always synonymous with "sex," because, hey, eating an apple isn't a sin. There is also that bit about being fruitful and multiplying, plus they were naked, so it makes sense to equate this Original Sin with sex. Currently, the opening sequence of the television show *Desperate Housewives* takes advantage of this common association: We see a Monty-Pythonesque adaptation of one of Lucas Cranach the Elder's sixteenth-century *Adam and Eve* paintings; Eve receives a bright red apple from the mouth of the snake coiled in the tree branches above; Adam receives a crushing blow from a hippo-sized apple that falls from beyond the frame; apples fall in a steady precipitation: apples everywhere symbolizing sensuality, freedom from fidelity, licentious liberation, recalling Eve's evolution, Adam's atomization, the serpent's sequestration for setting us free.

Then they knew they were naked, were driven out of paradise, sent to toil in the harsh world. In this, the story of our collective first memory, Adam and Eve ate the apple and were thereby banished, separated from their Father.



PLUMS, LONG EVERYWHERE, FLUX

It is tempting to revisit metaphors when their symbols are literally before us: beyond fructiferous multiplications: fruits of labors, by their fruits ye shall know them, when saw we thee an hungred, and fed thee? One sultry day in Uruguay, my neighbor Lemes asked my mission companion Solomon and me for help picking plums from two trees in his yard. They were delicious, so sweet and so...not yet cold...and brightly colored, and they came off their twigs easily with a gentle tug. We sat on branches eating plums in the trees, we let the overripe plums fall to the dogs, we gathered buckets full of plums. When we were done, Lemes sent us with our payment, a white plastic bag of plums. We wanted to save them and eat them later, but we took them to José and Teresa's shack, left them just inside the unlocked door, then slipped quietly away.

(Or consider this anecdote from my early courtship with Karina: As my future mother-in-law was taking my measurements so she could special order a wool parka for me, she noted, "You have long arms, like Karina." My response: "I'm long everywhere." It took years—until Karina and I were married with two children, and she and her mother were making fun of me—for me to understand the off-color joke I had made.)

This is just to say that part of the problem in counting things like fruit is flux. There are plums growing on trees, being eaten, falling to the ground and rotting, losing their plumness. Dust we are, to dust we are returning. Second is a problem of definition: what constitutes a plum? an apple? a grape? Are the deflated, sour grapes viable? If I leave them outside to rot, when do they stop being grapes and become dirt? Another part of the problem, I think, is the result of communication. Ages ago, there were enough apples to feed the clan, enough grapes to eat and to make wine; a few went bad and were thrown away; a few apples fell to the wasps and the dogs. Life was parochial and compartmentalized. There were cows and sows and rows of corn in plentiful supply. Their numbers were big, but comprehensible. Once we see the expanse of this vast world, once we can know, almost instantly, the tragedies our brothers and sisters are facing halfway around the globe, once our fruits come to us no matter the season and from far away, more temperate places that grow things we could not have otherwise, we no longer wonder, at least not so much, how many there are of things.

There is always enough of everything we could possibly want; it is automatically replenished on the shelves and bins, under the timely spray showers.

AVOGADRO

Not many people get numbers named after them. I can think of only one off-hand: Avogadro, whose name derives from the Latin for “lawyer” or “advocate,” which aptly describes what he was trained to do, but not what he ended up doing.



We remember Avogadro today mostly because of his molecular hypothesis, which states that equal volumes of gas contain equal numbers of particles.

Avogadro’s Law combined with Charles’s and Boyle’s gives us the Ideal Gas Law, represented notationally as $PV=nRT$ (Pressure times Volume equals n moles times the Universal Gas Constant (8.3145 J/mol K) times Temperature). Thus we can determine that a volume of 22.4 liters of any gas at 0°C and atmospheric pressure contains about 6.0221367×10^{23} particles (one “mole”). What does such a figure mean? Bob Everson, of Purdue University, offers this supposal:

Let us suppose that the entire state of Texas, with an area of 262,000 square miles, were covered with a layer of fine sand 50 feet thick, each grain of sand being $1/100$ of an inch in diameter. There would then be Avogadro’s number of sand particles in this immense sandpile.

At the same time, the quantity can seem quite manageable. Go drink yourself a pint of water. There went 25 moles of H_2O .

Avogadro’s published works bore titles representative of their times; nevertheless, I feel a tug when I read them. For one thing, they’re ridiculously long. For another, they’re all *essays* or *memoirs*. His earliest postulation of the molecular hypothesis appeared in 1811’s “*Essai d’une manière de déterminer les masses relatives des molécules élémentaires des corps....*” In 1814, he followed up with “*Mémoire sur les masses relatives des molécules des corps simples....*” His magnum opus

was called *Fisica dei Corpi Ponderabili...* (*Physics of Ponderable Bodies*). In 1820, after several years teaching at both the high school and college levels, Avogadro was appointed chair at the University of Turin of *fisica sublime*, which you almost don't want to translate. What would you translate it to? Sublime physics? *Fisica sublime* has the necessary rhythm, the dreamy tone of the unending, ever-approximated, never-known.

At the time Avogadro was doing his thinking (almost never experimenting), chemistry was far more mysterious than it is now. His generalization about the relationship between volume and particle quantity would prove essential for chemists to determine relative elemental weights. Still, Avogadro's work remained obscure during his lifetime, partly because he never traveled to Paris (Piedmont, his province, was under French governance during part of his lifetime), preferring instead to remain with his wife and six children in Turin. In 1860, four years after Avogadro died, Stanislao Cannizzaro presented his first arguments recognizing Avogadro's hypothesis as valid, but the idea still took over twenty years to really catch on. In 1869, Alexander Naumann christened the hypothesis "Avogadro's Law"; around the turn of the century, Jean Baptiste Perrin calculated Avogadro's number and named it in his honor.

According to Mario Morelli, a recent biographer, Avogadro's work consisted of

speculations...based on others' experimental data,...ad hoc assumptions, and often daring conclusions.

Today he has been reduced to his law and the number that bears his name (he is commemorated every Mole Day, October 23 from 6:02 a.m. to 6:02 p.m. (get it? 6:02 10/23?)); still, this is a far greater legacy than the vast majority of his contemporaries. Amedeo Avogadro is considered a lawyer, statesman, statistician, meteorologist, chemist, physicist, mathematician, and philosopher: in other words, and by his own admission, an essayist.

MOZART, FALCO, HOT POTATOES, SOCKS

I suspect that Amedeo is the same name as Amadeus, whose most famous bearer, Mozart, inspired not only Eddie Van Halen and Valerie Bertinelli's son's name (Wolfgang) but the famous Falco

song “Rock Me, Amadeus,” which we listened to (whether we wanted to or not) for an entire year and which we still hear every now and then on ’80s radio shows. I was living in Louisiana at the time, a transplant from New Jersey, learning little by little to say “sir” and “ma’am,” but not “y’all,” which I say now as often as I please, but which I said then only once, deep in the woods, at a Boy Scout camp, playing a game called Indian Village, because I wanted to disguise my voice and trick the other team. I associate the general vibe of that time in Louisiana with Falco’s hit song, but more so, I associate with it one particular high school track meet, about an hour from Baton Rouge, when one of our team’s two vans broke down and we had to remove all the equipment (poles, shots, discs, etc.) from the working van and pile everybody in, some kids on the floor, some sitting on laps or lying across the backs of a few rows of seats. All the ride home, it seems now, we sang “Rock Me, Amadeus,” but with our own lyrics: “Hot potatoes, hot potatoes... hot potatoes / Hot potatoes, hot potatoes...hot potatoes,” et cetera, ad nauseum, accompanied by up-and-down hand movements like we were tossing potatoes back and forth. Everybody was in on it, even the cool kids, who, in other circumstances, would not have let on that they liked the song, could not have legally participated in such immature tomfoolery. “Oh oh oh, hot potatoes!”

For the most part, these were good guys, even though they taunted me for wearing my socks pulled up to my knees. Also, the socks were gray and had colored stripes. This was too much for them, and they pulled at them and pushed my buttons. Where other groups of rebels might have yanked a kid’s underwear to give him a wedgie, these guys were content to sidle up to me and pull down my socks. Nowadays my wife does the same thing, though my socks are no longer gray, they don’t have colored stripes, and they only come up to my calves. Still, this is too high for her. She buys me those socks that don’t even cover my ankles and expects me to wear them with shorts, like one of those fitness dancer fellows on daytime cable exercise shows. She says I look like an old man with my socks pulled up. I tell her at least they’re not black socks, and at least I’m not wearing sandals.

Everybody had a good year.

Everybody let their hair down.

Everybody pulled their socks up.
Everybody put their foot down.
—John Lennon, “I’ve Got a Feeling”

Michael Cooper, a multi-purpose player (and defensive magician) on the Los Angeles Lakers basketball team during this same time when I was in Louisiana, used to wear *his* socks pulled all the way up to his knees, and, at least as far as I knew, nobody gave *him* any guff. He began wearing his socks pulled high in 1973 at a league championship game where his Pasadena High School team played against El Rancho. This must have been big stuff, because the game was televised on NBC. He had a good reason for pulling those socks up. “My grandmother had cataracts,” said Cooper...

That game was the first time she was going to watch me play basketball, so she said, “Michael, you’re going to have to do something to distinguish yourself from the others.” So I pulled my socks up real high, so she could see me.

I’ve never thought beyond the name Amedeo before, which is to say I’ve taken it at face value, but recently, as I’ve noted the similarities between Amedeo and Amadeus, I’ve come to a sort of connection or revelation: that *Amadeus* must mean “Loves God.” If it doesn’t, it should. Let me check. OK, I’m back. Apparently my suspicions were essentially correct: “Love of God.” I learned, too, that Mozart was baptized Wolfgang Theophilus Mozart, but preferred the Latin translation of his Greek middle name. The name *Wolfgang*, I suspect, means just what it sounds like: a gang of wolves. This, as Dave Barry would surely note, would make a great name for a band (a lot better than Steppenwolf, where there’s only one wolf, and he’s just steppin’).

The name *Theophilus* ought to send any Christian straight to his Bible, where one Theophilus (probably a representative name used by Luke to address all believers, I was told once or twice in my catechism classes) is the addressee of both of Luke’s books, the Gospel According to and the Acts of the Apostles. So I went right to my Bible. Often when I do something like this, I find, to my astonishment, a connection to my project, some symbol or metaphor, some uncanny correlation to the overall theme. But not in this case. In

fact, Luke is resolutely anti-essayistic in his bearings. His purpose in writing, he says, is

It seemed good to me also, having had perfect understanding of all things from the very first, to write unto thee in order, most excellent Theophilus, that thou mightest know the certainty of those things, wherein thou hast been instructed.

—Luke 1:3–4

Perfect understanding and certainty are also, like star-telling, divine attributes, so far from realistic human experience as to seem dizzyingly undesirable. I enjoy my essaying too much for such absolutes. And besides, let's get real...

Left and rites of passage
Black and whites of youth
Who can face the knowledge
That the truth is not the truth?
Obsolete absolute, yeah!
—Neil Peart, "Distant Early Warning"

CAESAR'S LAST BREATH

*How many centuries make up this moment I'm now living? How many airs
form the air I breathe?*

—Eduardo Galeano, *Days and Nights of Love and War*

While we may generally assume that Abraham's descendants remained local for long stretches of time, were shunned at other times, and were killed genocidally at yet another time, we might conversely assume that the air, or at least the nitrogen, expelled by Julius Caesar in his dying exclamation ("*Et tu, Brute?*" or whatever it might have been) has been adequately preserved and dispersed by wind and weather to an even distribution of molecules throughout the atmosphere. At least that's what John Allen Paulos argues in his book *Innumeracy*:

Take a deep breath. Assume Shakespeare's account is accurate and Julius Caesar gasped "You too, Brutus" before breathing his

last. What are the chances you just inhaled a molecule which Caesar exhaled in his dying breath? The surprising answer is that, with probability better than 99 percent, you did just inhale such a molecule.

For those who don't believe me: I'm assuming that after more than two thousand years the exhaled molecules are uniformly spread about the world and the vast majority are still free in the atmosphere. Given these reasonably valid assumptions, the problem of determining the relevant probability is straight-forward. If there are N molecules of air in the world and Caesar exhaled A of them, then the probability that any given molecule you inhale is from Caesar is A/N . The probability that any given molecule you inhale is not from Caesar is thus $1 - A/N$. By the multiplication principle, if you inhale three molecules, the probability that none of these three is from Caesar is $[1 - A/N]^3$. Similarly, if you inhale B molecules, the probability that none of them is from Caesar is approximately $[1 - A/N]^B$. Hence, the probability of the complementary event, of your inhaling at least one of his exhaled molecules, is $1 - [1 - A/N]^B$. A , B (each about $1/30$ th of a liter, or 2.2×10^{22}), and N (about 10^{44} molecules) are such that this probability is more than .99. It's intriguing that we're all, at least in this minimal sense, eventually part of one another.

Even though Paulos misstates average breath volume (adult human lungs can contain between four and five liters, and an average breath is about $1/2$ a liter, not $1/30$, especially if you "take a deep breath," as Paulos directs), and $1/30$ of a liter does not contain 2.2×10^{22} molecules (that's the number of molecules in *one* liter), his conclusion is not far off. Still ignoring the loss of free molecules to combinations (most notably O_2 to H_2O), Peter L. Renz, in a rebuttal and reworking of Paulos's calculation, derives an 84% probability that your most recent inhalation brought with it a molecule exhaled by Caesar. And even though Paulos doesn't give credit, the question may be traced to James Jean's 1942 *An Introduction to the Kinetic Theory of Gases*, and may be considered yet one more example of a Fermi problem, named after Enrico Fermi, whose theoretical and experimental work in atomic physics paved the way for the atom bomb; whose children, through their mother, were descendants of Abraham (which led to the family's emigration from fascist Italy);

and who was well-known for his habit of making accurate order-of-magnitude calculations based on rough assumptions with little real data. In other words, he could envision a closed system for the sake of argument, ignoring outside effects and influences, and even though his calculations would be rife with errors, these would cancel out, and he would come up with approximations very close to more carefully calculated (or experimentally measured) answers. For instance, during the first atomic bomb test, on July 16, 1945, he dropped bits of paper on the ground and measured how far they were blown by the blast wind. From this, he estimated that the blast had the power of 10 kilotons of TNT, and he was not far off. Fermi's best-known problem is "How many piano tuners are there in Chicago?" which he posited to his students at the University of Chicago. Hans Christian von Baeyer solves the problem this way in *The Fermi Solution*:

If the population of metropolitan Chicago is three million, an average family consists of four people and one third of all families own pianos, there are two hundred and fifty thousand pianos in the city. If every piano is tuned once every five years, fifty thousand pianos must be tuned each year. If a tuner can service four pianos a day, two hundred and fifty days a year, for a total of one thousand tunings a year, there must be about fifty piano tuners in the city.

The answer cannot be exact, but, given a glance at the Chicago yellow pages, von Baeyer says, it's in the ballpark. So I want to say that Fermi, and his disciples, despite their sometime need for hard calculations and precise answers, are essayists at heart, grappling with the vast, searching not for exactness but for approximate knowledge, hints and intimations.

Of course, there's nothing special about Caesar's last breath as compared to the last breaths of everyone else, or their first breaths, or their twelfth breath after they got out of bed on the morning of their eighteenth birthday. The point is that we're all breathing recycled air. For what it's worth, though, the likelihood of you breathing molecules from Thomas Edison's last breath is somewhat smaller, since, first of all, he died only in 1931, and, second of all, his son Charles captured much of it in a test tube that now resides in the Henry Ford Museum in Dearborn, Michigan. Ford apparently

believed that a dying breath contained a person's departing soul. He convinced Charles to save the expiration, perhaps hoping to cheat death and reconstitute the essence of his friend at some later date.

REUNION

*To see a world in a grain of sand,
And a heaven in a wild flower,
Hold infinity in the palm of your hand,
And eternity in an hour.*
—William Blake, "Auguries of Innocence"

In my thirty-five years, I have been to only one family reunion. There have been other visits with my father's siblings and their families, and sometimes with his Uncle Jim or his cousin Diane or her mother, Aunt Marge, but these were casual and partial. My mother had almost no relatives (one cousin, whom we called Aunt Terry, and that was it), and my father's family lived, for the most part (most of them, most of the time) in Wisconsin, while we lived, for the most part, in New Jersey. That one reunion happened in the mid-1980s in Milwaukee. Gathered together were the descendants of John and Emma Vander Heyden, my father's mother's parents. There were nearly a hundred people there. To me, they were nearly all strangers.

If we were to gather the descendants of my grandfather, Patrick Charles Madden I, for a convenient starting point, we would find his blood in twenty-three bodies, aged from fourteen months (my daughter) to sixty-three years (my father). There would be eight spouses adopted in, contributing their own families' genes to the mix in five cases. Two of the newest, a brother and sister who married two of my cousins, sister and brother, would have yet to participate in the offspring project. Nineteen of us would carry my grandfather's last name. Four of us would carry his first name; three of us would carry all of his names, followed by various Roman numerals, mostly *Is*.

How many people are there in every family with the same name
and surname?
—Montaigne, "Of Names"

The youngest six among us, his great-grandchildren, would have received one-eighth of their genes from him, enough for relatives on this side of the family to attribute their blue eyes or small ears or twinkling smile to him. Others, perhaps, would have received less visible traits: eyebrow configurations, narrow shoulders, or the right-ear-lower-than-the-left-ear thing. The jury is still out on whether we might be genetically predisposed to aspects of his personality or his talents, but it would seem so. He was a wry man, a bit befuddled by the world, an observant painter-in-watercolors.

As it is, Patrick Charles Madden I, who received his Roman numeral only when his wife refused to call their son Junior, died twenty years ago, before eight of us were born and before six of the spouses got a chance to meet their father- or grandfather-in-law. Seven more of us never *really* got to know him; Alzheimer's disease wore away his memory bit by bit until he no longer recognized his own children, then plum forgot how to speak, then fell down and broke a hip and disintegrated. I, his oldest grandchild, was lucky in that when I was little, we would visit him, and he lived with us for a brief time near the beginning of his Alzheimer's woes. He sang to me, drew me pictures of jack-o'-lanterns and scarecrows, told me his stories and listened to my stories. But in the end, many of us didn't even make it to his funeral. I think I did not want to face death, or I was busy and interested in school and sports. He had been leaving us slowly for nearly a decade; essentially he was already gone. From my family, my father and younger brother David made the trip by themselves.

So let's call it thirty-one people at the reunion. We tell stories about Grandpa, about how he was fascinated by the accuracy and rapidity of the brand-new thirty-cent toll booths on the Tri-State Tollway, once musing that, "If you put in only twenty-nine cents, that thing won't budge. And right away, too!" or about how he laughed with his boys when Tom discovered an apple on the "pear" tree he had bought years before (and about which he had liked to joke: "Karras still throws more shade than those trees he sold me"). Thirty-one people with some interest in this man who doesn't exist on the Internet or in anybody's books, who is as unknown by his great-grandchildren as his father is by me, who faded to a shell before he died. Thirty-one people: but even that small number is hard to determine, hard to keep in the mind. I certainly didn't know it before I began to write this, and I had to plot it out on paper; I

couldn't simply enumerate in my head. On the margins, possible additions, there is Bill, no longer married to Aunt Lynne, father of Ryan and Sarah. There is Michelle, never married to Uncle Jeff, mother of Paul. I have a recent email from Heather, Paul's wife, with pictures of their two children, Noah and Sophia; otherwise, I would not know how to count that branch of the family. I don't keep in touch at all with Ryan and Sarah, nor their mother, nor their younger sister Gabrielle, who must be about thirteen by now; the last time I saw her she was an infant. I had to hear it through the grapevine (my sister, who does a slightly better job maintaining contact, who's visited Aunt Lynne fairly recently) that Ryan and Sarah aren't yet married and have no children. We are scattered, outside each other's systems, strangers for years at a time.

And why this intent focus on the paternal-paternal line? Am I not also my mother and grandmothers and my mother's father and grandfathers? Yes, but indulge me, dear reader. We cleave unto them that are like us. Men find inspiration in men, boys look up to fathers, want to play catch and converse in the twilight, hear the similarities in their voices and radiate pride when they surpass them in height or in arm wrestling. And more so for me, who share my father's and grandfather's name, and who gave the name to my son, too. And what a name it is, in any case: Patrick, of the Irish saint who was not Irish, from the Latin for *patriarch*. So is it any wonder that I follow my urge to essay to understand my father's father, the father of my name; or Abraham, the father of many nations, the first of the great biblical patriarchs?

FIN

*But praise falls in with surfeit...
For sands cannot be counted,
And how many joys
This man has brought his fellows, who can say?
—Pindar, "Olympian Ode 2"*

As for me, all this essaying about vast quantities and procreation has got me dreading the conversation I must have, three years hence, I suppose, with my son, to explain to him the mechanisms of human reproduction, to instruct him in what he must do to cre-

ate that Patrick Charles Madden V he sometimes says he wants (the apples have not fallen far from their respective trees). I am not so squeamish about the details as about the admission. I remember the conversation my father had with me, in the car on the way home from a Boy Scout camping trip: there is a winding road cutting through grassy hills, a frozen scene, perhaps the view at the moment I realized what he was going to say. I knew it all already, had gathered it in bits and pieces ever since some kid I knew told me his mother told him. We were in an alcove of branches under the bushes in my back yard, in the Land of the Lost cave, as I called it. I couldn't believe what he said, but I couldn't disprove it, either. I was seven or eight.

Thus I also wonder at my origins, at the cosmic coincidence that my father's gravest mistake, down the line, gave birth to me. He had quit college, midway through his senior year, because he wanted to change his major from chemical engineering to music. He left school, failed (to show up for) his exams, went to work for a friend of an uncle pouring concrete basements in Milwaukee, and was almost immediately drafted to fight in Vietnam. Along the way, he was trained in electronics repair at Fort Monmouth, New Jersey. On weekends, he went into New York City, to Cardinal Spellman's Servicemen's Club, where he played ping-pong against my mother, a spunky girl from Brooklyn, the only girl who could beat him.

There, too, in my wonderings is my grandfather, Patrick I, in training at Camp Polk, Louisiana, soon to leave for the European theater; his bride arrives from Milwaukee by bus, they are married on 9 May 1942, though they can't then remain together long. If you call it biological imperative or animal instinct or machismo—that night in the army housing or a nearby hotel when my father was conceived—I will sock you in the jaw. That scientific determinism is to me only a secular Calvinism, robbing my forebears of their free will, tracing back the results to their inevitabilities. There is something more here, more than a man desperate and mechanically driven to pass on his genes, to ensure the continuance of his line, something Darwin never theorized, though he may have known it with his own wife, or imagining his own grandparents. There is love, yes, and there are passionate rumblings and urgings. There is an abyss of the unknowable, the impossibility of a future, 405,099 American soldiers just like him who wouldn't return, millions more around the world returned to the

earth with a bullet in the chest, a foot blown to bits, a torn-off limb. I imagine they were scared and in love, my grandparents, frantic for every moment they could steal from uncertainty. If my grandmother was the apple of my grandfather's eye, and my father was then only a twinkle in his father's eye, then I, III, was that imperceptible twinkle within the reflected light diffused from the deep red skin of the apple after he's shined it on his sleeve, as he brings it to his mouth to take a bite. I was a distant, vague notion, never voiced, but perhaps thought of, within that word *grandson*, or within that roomy name *Patrick Charles Madden*.

Our causes can't see their effects
—Neil Peart, "Natural Science"

Then he was gone to Europe until my father was two.

I had not thought of this until now: My father was named by his mother while her husband was far away fighting. I never met her, but I think I have caught a window into her soul: that she named him Patrick Charles Madden II just in case, or to ensure something, to stave off the telegram, to keep her husband, her hope against hope, alive no matter what. While in Europe he was shot at and captured by German forces in France, yet he returned in one piece while hundreds of thousands just like him returned or not at all or in pine boxes. Why him and not them?

Besides Abraham's plea for Sodom, the other great—the greatest—biblical grapple with the problem of evil is the story of Job, who lost everything but his faith. His philosophical arguments with his friends, his justifications of his worthiness and righteousness, revealed a different Holy Father, one more like me: sick of the complaining, sick of explaining, raging against incomprehension and vain words:

Where wast thou when I laid the foundations of the earth?
declare, if thou hast understanding.
—Job 38:1

In the end, God never puts to rest the problem of evil; his response, while convincing in its ethos, amounts to "because I said so." So we're left back where we started, but perhaps we're left with a friend

and example in Job, who, in spite of his superhuman long suffering, seems utterly human in his questioning. Elie Wiesel, in his Nobel Prize acceptance speech, praises Job's fidelity *and* his chutzpah:

Job was determined not to repudiate the creation, however imperfect, that God had entrusted to him.... The source of his hope was memory.

When we plumb the depths of memory, when we rediscover those earliest imprints and connections, we often find that our first recollections are traumas: unexpected pain, grief, shocks or surprises. My own first memory is me on a gurney trying to fool the doctor who explained that the mask he was placing over my face would make me sleep. I closed my eyes and breathed shallowly, not wanting to really lose consciousness, wanting to trick him and thereby avoid the operation (for a hernia, I learned later). My sister, Kathleen, remembers hearing but not comprehending the blaring of our home fire alarm; she was in the bathroom, standing on a step stool, with soap on her hands, when Dad burst in, grabbed her, ran her downstairs, and dropped her on the driveway next to me. My brother David remembers falling down the stairs and "cracking [his] head open" (as our mother, and probably your mother, too, used to say). Dan, my youngest brother, also cracked his head open (on the corner of an end table in a hotel) in his first memory. Karina's first memory is of falling off the wall outside the factory where her mother worked. Yet amidst all this distress and misfortune, here is my father's first memory: A tall man arrives to pick him up from a nursery. This is his father, he would learn later, though at the time, he didn't know there was such a thing.

I remember sitting in the small Ford coupe that was our family car and looking in the back at a bag or a basket of roundish purple things. What are those? I ask. Those are plums. Can I have one? Yes. It squirts delicious juice into my mouth as I take my first bite.