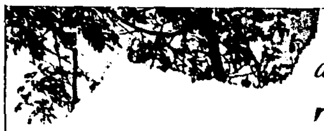

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Paul Erdös is certainly the most prolific—and probably the most eccentric—mathematician in the world

THE MAN WHO LOVES ONLY NUMBERS

BY PAUL HOFFMAN

IT IS DINNERTIME IN GREENBROOK, NEW JERSEY, AND Paul Erdös, seventy-four, has lost four mathematical colleagues, who are sitting fifty feet in front of him, sipping green tea. Squinting, Erdös scans the tables of the small Japanese restaurant, one arm held out to the side like a scarecrow's. He is angry with himself for letting his friends slip out of sight. His mistake was to pause at the coat check while they charged ahead. His arm is flapping wildly now, and he is coughing. "I don't understand why the SF has seen fit to send me a cold," he wheezes. (The SF is the Supreme Fascist, the Number-One Guy Up There, God, who is always tormenting Erdös by hiding his glasses, stealing his Hungarian passport, or, worse yet, keeping to Himself the elegant solutions to all sorts of intriguing mathematical problems.) "The SF created us to enjoy our suffering," Erdös says. "The sooner we die, the sooner we defy His plans."

Erdös still does not see his friends, but his anger dissipates—his arm drops to his side—as he hears the high-pitched squeal of a small boy, who is dining with his parents. "An epsilon!" Erdös says. (*Epsilon* is Erdös's word for a small child; in mathematics that Greek letter is used to represent small quantities.) Erdös moves slowly toward the child, navigating not so much by sight as by the sound of the boy's voice. "Hello," he says, as he reaches into his ratty gray overcoat and extracts a bottle of Benzedrine. He tosses the bottle into the air and catches it at the last second. The epsilon is not at all amused, but, perhaps to be polite, his parents make a big production of applauding. Erdös repeats the trick a few more times, and then he is rescued by one of his confederates, Ronald Graham, the director of the Mathematical Sciences Research Center at AT&T Bell Laboratories, who calls him over to the table where he and Erdös's other friends are waiting.

The waitress arrives, and Erdös, after inquiring about each item on the long menu, orders fried squid balls. While the waitress takes the rest of the orders, Erdös turns over his placemat and draws a tiny sketch vaguely resembling a rocket passing through a hula hoop. His four dining companions lean forward to get a better view of the world's most prolific mathematician plying his craft. "There are still many edges that will destroy chromatic number three," Erdös says. "This edge destroys bipartiteness." With that pronouncement Erdös closes his eyes and seems to fall asleep.

MATHEMATICIANS, UNLIKE OTHER SCIENTISTS, REquire no laboratory equipment. A Japanese restaurant is as good a place as any to do mathematics. Mathematicians need only peace of mind and, occasionally, paper and pencil. "That's the beauty of it," Graham says. "You can lie back, close your eyes, and work. Who knows what problem Paul's thinking about now?"

Erdös has thought about more problems than any other mathematician in history. He has written or co-authored more than 1,000 papers, many of them monumental, and all of them substantial. In the past year alone he has published fifty papers, which is more than most good mathematicians write in a lifetime. He has shown that mathematics is not just a young man's game.

Erdös (pronounced "air-dish") has structured his life to maximize the amount of time he has for mathematics. He has no wife or children, no job, no hobbies, not even a home, to tie him down. He lives out of a shabby suitcase and a drab orange plastic bag from Centrum Aruhaz ("Central Warehouse"), a large department store in Budapest. In a never-ending search for good mathematical problems and fresh mathematical talent, Erdös crisscrosses four continents at a frenzied pace, moving from one university or research center to the next. His modus operandi is to show up on the doorstep of an esteemed mathematician, declare, "My brain is open," work with his host for a day or two, until he's bored or his host is run down, and then move on to another home. Erdös's motto is not "Other cities, other maidens" but "Another roof, another proof." He has done mathematics since he was three, but for the past sixteen years, since the death of his mother, he has put in nineteen-hour days, keeping himself fortified with ten to twenty milligrams of Benzedrine or Ritalin, strong espresso, and caffeine tablets. "A mathematician," Erdös is fond of saying, "is a machine for turning coffee into theorems." When friends urge him to slow down, he always has the same response: "There'll be plenty of time to rest in the grave."

Erdös lets nothing stand in the way of mathematical progress. When the name of a colleague in California comes up at breakfast in New Jersey, Erdös remembers a mathematical result he wants to share with him. He heads toward the phone and starts to dial. His host interrupts him, pointing out that it's 5:00 A.M. on the West Coast. "Good," Erdös says, "that means he'll be home." Where challenged further in situations like this, Erdös has been known to respond, "Louis the Fourteenth said, 'I am the state'; Trotsky could have said, 'I am society'; and I say, 'I am reality.'" No one who knows him would argue. "Erdös has a childlike tendency to make his reality overtake yours," a friend says. "And he's not an easy houseguest. But we all want him around—for his mind. We all save problems up for him." To communicate with Erdös you must learn his language—not just "the SF" and "epsilon" but also "bosses" (women), "slaves" (men), "captured" (married), "liberated" (divorced), "recaptured" (remarried), "noise" (music), "poison" (alcohol), "preaching" (giving a mathematics lecture), "Sam" (the United States), and "Joe" (the Soviet Union). When he says someone has "died," Erdös means that the person has stopped doing mathematics. When he says someone has "left," the person has died.

At five foot six, 130 pounds, Erdös has the wizened, cadaverous look of a drug addict, but friends insist that he was frail and gaunt long before he started taking amphetamines. His hair is white, and corkscrew-shaped whiskers shoot out at odd angles from his face. He usually wears a gray pin-striped jacket, dark trousers, a red or mustard shirt or pajama top, and peculiar pockmarked Hungarian leather shoes, made specially for his flat feet and weak tendons. His whole wardrobe fits into his one small suitcase, with plenty of room left for his dinosaur of a radio. He has so few clothes that his hosts find themselves washing his socks and underwear several times a week. "He could buy more," one of his colleagues says, "or he could wash them himself. I mean, it takes zero IQ to learn how to operate a washing machine." But if it's not mathematics, Erdös won't be bothered. "Some French socialist said that private property was theft," Erdös recalls. "I say that private property is a nuisance."

All of his clothes, including his socks and custom-made underwear, are silk, because he has an undiagnosed skin condition that is aggravated by other kinds of fabric. He doesn't like people to touch him. If you extend your hand, he won't shake it. Instead, he limply flops his hand on top of yours. "He hates it if I kiss him," says Magda Fredro, sixty-six, a first cousin who is otherwise very close to him. "And he washes his hands fifty times a day. He gets water everywhere. It's hell on the bathroom floor."

Although Erdös avoids physical intimacy, and has apparently always been celibate, he is friendly and compassionate. "He exists on a web of trust," says Aaron Meyerowitz, a mathematician at Florida Atlantic University. "When I was a graduate student and we had never met before, I gave him a ride. I didn't know the route and asked him if he wanted to navigate with a map. He didn't want to. He just trusted that I, a total stranger, would get him there." What little money he receives in stipends or lecture fees he gives away to relatives, colleagues, or graduate students. A few years ago he won the prestigious Wolf prize, the most lucrative award in mathematics. He contributed most of the $50,000 he received to a scholarship in Israel in the name of his parents. "I kept only seven hundred and twenty dollars," Erdös says, "and I remember someone commenting that for me even that was a lot of money to keep." The two times he lectured in India he had the fee sent to a woman he has never met, the widow of Srinivasa Ramanujan, a legendary mathematical prodigy who died of tuberculosis at the age of thirty-two. Whenever Erdös learns of a good cause—a struggling classical-music radio station, a fledgling Native American movement—he promptly makes a small donation.

ERDÖS WAS BORN IN BUDAPEST ON MARCH 26, 1913, the son of two high school mathematics teachers. While his mother, Anna, was in the hospital giving birth to him, her two daughters, ages three and five, contracted septic scarlet fever and died within the day. "It was something my mother didn't like to talk about," Erdös says. "Their names were Clara and Magda, I think." Of the three children, the girls were considered to be the smart ones.

When Erdös was one and a half, his father, Lajos, was captured in a Russian offensive and sent to Siberia for six years. Erdös's mother kept him out of school, fearing that it was the source of childhood contagions. He stayed home until high school, and even then he went only every other year, because his mother kept changing her mind.

Erdös was a mathematical prodigy. At three he could multiply three-digit numbers in his head. At four he discovered negative numbers. "I told my mother," he recalls, "that if you take two hundred and fifty from a hundred you get minus a hundred and fifty." He knew then that he wanted to be a mathematician, although he would pay attention to his tutorials in history, politics, and biology. As soon as he could read, his mother plied him with medical literature, which he eagerly studied. She apparently had vague hopes that he might become a doctor.

When Erdös was seventeen, he entered the University of Budapest; he was graduated four years later with a Ph.D. in mathematics. In October of 1934 he went to Manchester, England, for a four-year postdoctoral fellowship. "I left Hungary for political reasons," Erdös says. "I was Jewish, and Hungary was a semi-fascist country. But I was very homesick, so I went back three times a year, for Easter, Christmas, and the summer. In March, 1938, Hitler went into Austria, and it was too dangerous for me to return to Hungary in the spring. I did slip back in during the summer. But on September 3, 1938, I didn't like the news—the Czech crisis—so I went back to England that evening and was on my way to the United States three and a half weeks later. The Nazis ended up murdering four of my mother's five brothers and sisters, and my father died of a heart attack in 1942.

"Then my problems started with Sam and Joe. I didn't want to return to Hungary because of Joe. In 1954 I was invited to an international mathematics conference in Amsterdam. Sam didn't want to give me a re-entry permit. It was the McCarthy era. The immigration officials asked me all sorts of silly questions. 'Have you read Marx, Engels, or Stalin?' 'No,' I said. 'What do you think of Marx?' they pressed. 'I'm not competent to judge,' I said, 'but no doubt he was a great man.' So they denied me a re-entry visa. I had the classic American reaction: I left. I ended up mostly in Israel. In the 1960s Sam decided it was okay for me to return."

In 1964 his mother, at the age of eighty-four, started traveling with him. For the next seven years she accompanied him everywhere except to India, which she avoided because of her fear of disease. His mother hated traveling—she knew barely a word of English, and he traveled regularly to English-speaking countries—but she wanted to be with him. Wherever he did mathematics, she sat quietly, basking in his genius. They ate every meal together, and at night he held her hand until she fell asleep. "She saw in Paul the world," Fredro says. "He was her God, her everything. They stayed with me in 1968 or 1969. When they were together, I was nobody. It was like I didn't exist. That hurt me a lot, because I was very close to her. She was my aunt, and when I got out of Auschwitz, I went first to her home. She fed me and bathed me and clothed me and made me a human being again."

In 1971 Erdös's mother died of a bleeding ulcer in Calgary, Canada, where Erdös was giving a lecture. Apparently, she had been misdiagnosed, and her life might otherwise have been saved. Soon afterward Erdös started taking a lot of pills, first anti-depressants and then amphetamines. As one of Hungary's leading scientists, he had no trouble getting sympathetic Hungarian doctors to prescribe drugs. "I was very depressed," Erdös says, "and Paul Turán, an old friend, reminded me, 'A strong fortress is our mathematics.'" Erdös took the advice to heart and started putting in nineteen-hour days, churning out papers that would change the course of mathematical history. Still, math proved more of a sieve than a fortress. Ten years later, one day when Erdös was looking particularly gloomy, a friend asked him what was wrong. "Haven't you heard?" he replied. "My mother has left." Even today he never sleeps in the apartment that they once shared in Budapest, using it only to house visitors; he stays in a guest suite at the Hungarian Academy of Sciences.

Long before his mother died, Erdös became preoccupied with his own mortality. "My second great discovery [the first being negative numbers]," he says, "was death. Children don't think they're ever going to die. I was like that too, until I was four. I was in a shop with my mother and suddenly I realized I was wrong. I started to cry. I knew I would die. From then on I've always wanted to be younger. In 1970 I preached in Los Angeles on 'my first two-and-a-half billion years in mathematics.' When I was a child, the earth was said to be two billion years old. Now scientists say it's four and a half billion. So that makes me two-and-a-half billion. The students at the lecture drew a time line that showed me riding a dinosaur. I was asked, 'How were the dinosaurs?' Later, the right answer occurred to me: You know, I don't remember, because an old man only remembers the very early years, and the dinosaurs were born yesterday, only a hundred million years ago."

In the early 1970s Erdös started appending the initials P.G.O.M. to his name, which stand for Poor Great Old Man. When he turned sixty, he became P.G.O.M.L.D., the L.D. for Living Dead. At sixty-five he graduated to P.G.O.M.L.D.A.D., the A.D. for Archaeological Discovery. At seventy he became P.G.O.M.L.D.A.D.L.D., the L.D. for Legally Dead. And he plans next year, at seventy-five, to be P.G.O.M.L.D.A.D.L.D.C.D., the C.D. for Counts Dead. He explains, "The Hungarian Academy of Sciences has two hundred members. When you turn seventy-five, you can stay in the academy with full privileges, but you no longer count as a member. That's why the C.D. Of course, maybe I won't have to face that emergency. They are planning an international conference for my seventy-fifth birthday. It may have to be for my memory. I'm miserably old. I'm really not well. I don't understand what's happening to my body—maybe the final solution."

When Paul Turán, the man who had counseled, "A strong fortress is our mathematics," died, in 1976, Erdös had an image of the SF assessing the work he had done with his collaborators. On one side of a balance the SF would place the papers Erdös had co-authored with the dead, on the other side the papers written with the living. "When the dead side tips the balance," Erdös says, "I must die too." He pauses for a moment and then adds, "It's just a joke of mine."

Perhaps. But Erdös vigorously seeks out new, young collaborators and ends many working sessions with the remark, "We'll continue tomorrow, if I live." With more than 250 co-authors, Erdös has collaborated with more people than any other mathematician in history. Those lucky 250 are said to have "an Erdös number of 1," a coveted code phrase in the mathematics world for having written a paper with the master himself. If your Erdös number is 2, it means you have worked with someone who has worked with Erdös. If your Erdös number is 3, you have worked with someone who has worked with someone who has worked with Erdös. The mathematical literature is peppered with tongue-in-cheek papers probing the properties of Erdös numbers. Einstein had an Erdös number of 2, and the highest known Erdös number is 7.

Since 1954 Erdös has been spurring on his collaborators by putting out contracts on problems he hasn't been able to solve. The outstanding rewards total about $10,000, and range from $10 to $3,000, reflecting his judgment of the problems' difficulty. "I've had to pay out three or four thousand dollars," Erdös says. "Someone once asked me what would happen if all the problems were solved at once. Could I pay? Of course I couldn't. But what would happen to the strongest bank if all the creditors asked for their money back? The bank would surely go broke. A run on the bank is much more likely than solutions to all my problems."

Though he is confident of his skill with mathematics, outside that arcane world Erdös is very nearly helpless. Since his mother's death the responsibility of looking after him has fallen chiefly to Ronald Graham, who spends almost as much time handling Erdös's affairs as he does overseeing the seventy mathematicians, statisticians, and computer scientists at Bell Labs. Graham is the one who calls Washington when the SF steals Erdös's visa, and, he says, "the SF is striking with increasing frequency these days." Graham also manages Erdös's money, and was forced to become an expert on currency exchange rates because honoraria from Erdös's lectures dribble in from four continents. "I sign his name on checks and deposit them," Graham says. "I've been doing this so long I doubt the bank would cash a check if he endorsed it himself."

On the wall of Graham's office, in Murray Hill, New Jersey, is a sign: ANYONE WHO CANNOT COPE WITH MATHEMATICS IS NOT FULLY HUMAN. AT BEST HE IS A TOLERABLE SUBHUMAN WHO HAS LEARNED TO WEAR SHOES, BATHE, AND NOT MAKE MESSES IN THE HOUSE. Near the sign is the "Erdös room," a closet full of filing cabinets containing copies of Erdös's 1,000-plus articles. "Since he has no home," Graham says, "he depends on me to keep his papers. He's always asking me to send some of them to one person or another." Graham also handles all of Erdös's incoming correspondence, which is no small task, because many of Erdös's mathematical collaborations take place by mail. Last year Erdös sent out 1,500 letters, none of which dwelt on subjects other than mathematics. "I am in Australia," a typical letter begins. "Tomorrow I leave for Hungary. Let *k* be the largest integer. . . . "

Graham has had less success influencing Erdös's health. "He badly needs a cataract operation," Graham says. "I've been trying to persuade him to schedule it. But he refuses, because he'd be laid up for a week and he doesn't want to miss even seven days of working with mathematicians. He's afraid of being old and helpless and senile." Like all of Erdös's friends, Graham is concerned about his drug-taking. In 1979 Graham bet him $500 that he couldn't stop taking amphetamines for a month. Erdös accepted the challenge, and went cold turkey for thirty days. After Graham paid up—and wrote the $500 off as a business expense—Erdös said, "You've showed me I'm not an addict. But I didn't get any work done. I'd get up in the morning and stare at a blank piece of paper. I'd have no ideas, just like an ordinary person. You've set mathematics back a month." He promptly resumed taking pills, and mathematics has been the better for it.

Graham recently built an addition onto his house, in Watchung, New Jersey, so that Erdös would have his own bedroom and library for the thirty or so days he's there each year. Erdös likes staying with Graham because the household contains a second strong mathematician, Graham's wife, Fan Chung, a Taiwanese émigré who is the director of mathematics at Bell Communications Research, a spinoff of Bell Labs that does research for the regional phone companies. When Graham won't play with him, Chung will, and the two have co-authored fifteen papers.

Graham and Erdös seem an unlikely pair. Although Graham is one of the world's leading mathematicians, he has not, like Erdös, forsaken body for mind. Indeed, he has pushed both to the limit. At six foot two, with blond hair, blue eyes, and chiseled features, Graham looks at least a decade younger than his fifty-two years. He is an accomplished trampolinist, and he put himself through college as a circus acrobat. He can juggle six balls and is a past president of the International Jugglers Association. He has bowled two 300 games, is vicious with a boomerang, and more than holds his own at tennis and Ping-Pong.

While Erdös can sit for hours, Graham is always moving. In the middle of solving a mathematical problem he'll spring into a handstand, grab stray objects and juggle them, or jump up and down on the super-springy pogo stick he keeps in his office. "You can do mathematics anywhere," Graham says. "I once had a flash of insight into a stubborn problem in the middle of a back somersault with a triple twist on my trampoline."

"If you add up Ron's mathematical theorems and his double somersaults," one of his colleagues says, "he'd surely have a record." Graham, in fact, does hold a world record—one no less peculiar. He is cited in the *Guinness Book of World Records* for having used the largest number in a mathematical proof. The number is incomprehensibly large. Mathematicians often try to suggest the magnitude of a large number by likening it to the number of atoms in the universe or the number of grains of sand in the Sahara. Graham's number has no such physical analogue. It can't even be expressed in familiar mathematical notation, as, say, the number 1 followed by a zillion zeros. To cite it a special notation had to be invoked, in which exponents are heaped on exponents to form a staggering leaning tower of digits.

Besides staying on the cutting edge of mathematics and acrobatics, Graham has found time to learn Chinese and take up the piano. Neither his wife nor his co-workers understand how he does it. "It's easy," Graham says. "There are a hundred and sixty-eight hours in *every* week."

Erdös and Graham met in 1963 in Boulder, Colorado, at a conference on number theory, and they have been collaborating ever since, writing twenty-five papers and one book together. That meeting was also the first of many spirited athletic encounters the two have had. "I remember thinking when we met that he was kind of an old guy," Graham says, "and I was amazed that he beat me at Ping-Pong. That defeat got me to take up the game seriously." Graham bought a machine that served Ping-Pong balls at very high speeds and went on to become Ping-Pong champion of Bell Labs. "We still play occasionally," Graham says. "Paul loves challenges. I give him nineteen points and play sitting down. But his eyesight is so bad that I can just lob the ball high into the air and he'll lose track of it."

In recent years Erdös has come up with novel athletic contests at which he'd seem to have more of a chance, though he invariably loses. "Paul likes to imagine situations," Graham says. "For example, he wondered whether I could climb stairs twice as fast as he could. We decided to see. I ran a stopwatch as we both raced up twenty flights in an Atlanta hotel. When he got to the top, huffing, I punched the stopwatch but accidentally erased the times. I told him we'd have to do it again. 'We're *not* doing it again,' he grumbled, and stalked off.

"Another time, in Newark Airport, Erdös asked me how hard it was to go up a down escalator. I told him it could be done, and I demonstrated. 'That was harder than I thought,' I said. 'That looks easy,' he said. 'I'm sure you couldn't do it,' I said. 'That's ridiculous,' he said. 'Of course I can.' Erdös took about four steps up the escalator and then fell over on his stomach and slid down. People were staring at him. He was wearing this ratty coat and looked like he was a wino from the Bowery. He was indignant afterward."

Erdös and Graham are like an old married couple, happy as clams but bickering incessantly, following scripts they know by heart though they are baffling to outsiders. Many of these scripts center on food. When Erdös is feeling well, he gets up about 5:00 A.M. and starts banging around. He'd like Graham to make him breakfast, but Graham thinks he should make his own. Erdös loves grapefruit, and Graham stocks the refrigerator when he knows Erdös is coming. On a recent visit Erdös, as always, peeked into the refrigerator and saw the fruit. In fact, each knew that the other knew that the fruit was there.

"Do you have any grapefruit?" Erdös asked.

"I don't know," Graham replied. "Did you look?"

"I don't know where to look."

"How about the refrigerator?"

"Where in the refrigerator?"

"Well, just look."

Erdös found a grapefruit. He looked at it and looked at it and got a butter knife. "It can't be by chance," Graham explains, "that he so often uses the dull side of the knife, trying to force his way through. It'll be squirting like mad, all over himself and the kitchen. I'll say, 'Paul, don't you think you should use a sharper knife?' He'll say, 'It doesn't matter,' as the juice shoots across the room. At that point I give up and cut it for him."

In mathematics Erdös's style is one of intense curiosity, a style he brings to everything else he confronts. Part of his mathematical success stems from his willingness to ask fundamental questions, to ponder critically things that others have taken for granted. He also asks basic questions outside mathematics, but he never remembers the answers, and asks the same questions again and again. He'll point to a bowl of rice and ask what it is and how it's cooked. Graham will pretend he doesn't know; others at the table will patiently tell Erdös about rice. But a meal or two later Erdös will be served rice again, act as if he's never seen it, and ask the same questions.

Erdös's curiosity about food, like his approach to so many things, is merely theoretical. He'd never actually try to cook rice. In fact, he's never cooked anything at all, or even boiled water for tea. "I can make excellent cold cereal," he says, "and I could probably boil an egg, but I've never tried." Erdös was twenty-one when he buttered his first piece of bread, his mother or a domestic servant having always done it for him. "I remember clearly," he says. "I had just gone to England to study. It was tea time, and bread was served. I was too embarrassed to admit that I had never buttered it. I tried. It wasn't so hard." Only ten years before, at the age of eleven, he had tied his shoes for the first time.

His curiosity about driving is legendary in the mathematics community, although you'll never find him behind the wheel. He doesn't have a license and depends on a network of friends, known as Uncle Paul sitters, to chauffeur him around. But he's constantly asking what street he's on and questioning whether it's the right one. "He's not a nervous wreck," Graham says. "He just wants to know. Once he was driving with Paul Turán's widow, Vera Sós. She had just learned to drive, and Paul was doing his usual thing. 'What about this road?' 'What about that road?' 'Shouldn't we be over there?' Vera was distracted and she plowed into the side of a car that must have been going forty or fifty miles an hour. She totaled it, and vowed that she would never drive with Erdös again."

But outside mathematics Erdös's inquisitiveness is limited to necessities like eating and driving; he has no time for frivolities like sex, art, novels, or movies. Once in a while the mathematicians he stays with force him to join their families on non-mathematical outings, but he accompanies them only in body. "I took him to the Johnson Space Center to see rockets," one of his colleagues recalls, "but he didn't even look up." Another mathematician took him to see a mime troupe, but he fell asleep before the performance started. A colleague whose wife is a curator at the Museum of Modern Art dragged Erdös to MOMA. "We showed him Matisse, but he would have nothing to do with it. After a few minutes we ended up sitting in the sculpture garden doing mathematics." Erdös hasn't read a novel since the 1940s, and thirty years have passed since he last saw a movie, *Cold Days*, the story of a 1942 atrocity in Novasad, Yugoslavia, in which Hungarians brutally drowned a few thousand Jews and Russians.

Erdös is a mathematical monk. He has renounced physical pleasure and material possessions for an ascetic, contemplative life, a life devoted to a single narrow mission: uncovering mathematical truth. What is this mathematics that could possibly be so diverting and consuming?

"THERE'S AN OLD DEBATE," ERDÖS SAYS, "ABOUT whether you create mathematics or just discover it. In other words, are the truths already there, even if we don't yet know them? If you believe in God, the answer is obvious. Mathematical truths are there in the SF's mind, and you just rediscover them. Remember the limericks:

There was a young man who said, 'God,
It has always struck me as odd
That the sycamore tree
Simply ceases to be
When there's no one about in the quad.'

'Dear Sir, Your astonishment's odd;
I am always about in the quad:
And that's why the tree
Will continue to be,
Since observed by,
Yours faithfully, God.'

"I'm not qualified to say whether or not God exists. I kind of doubt He does. Nevertheless, I'm always saying that the SF has this transfinite Book—transfinite being a concept in mathematics that is larger than infinite—that contains the best proofs of all mathematical theorems, proofs that are elegant and perfect." The strongest compliment Erdös can give to a colleague's work is to say, "It's straight from the Book."

"I was once introducing Erdös at a lecture," says Joel Spencer, a mathematician at SUNY at Stony Brook who has worked with Erdös since 1970. "And I started to talk about his idea of God and the Book. He interrupted me and said, 'You don't have to believe in God, but you should believe in the Book.' Erdös has made me and other mathematicians recognize the importance of what we do. Mathematics is there. It's beautiful. It's this jewel we uncover."

That mathematics could be a jewel may come as a surprise to those of us who struggled with multiplication tables as kids and now need help completing W-4 forms. Mathematics is a misunderstood and even maligned discipline. It's not the brute computations they drilled into us in grade school. It's not the science of reckoning. Mathematicians do not spend their time thinking up cleverer ways of multiplying, faster methods of adding, better schemes for extracting cube roots. Even those drawn to the subject have had misconceptions. "I always wanted to be a mathematician," Spencer says, "even before I knew what mathematicians did. My father was a CPA, and I loved numbers. I thought mathematics was about adding up longer and longer lists. I found out what it really was in high school. I'd undoubtedly be a lot richer now if I were making my living adding up long lists of numbers."

Erdös's cousin Magda Fredro hasn't the slightest idea what he does, even though she has known him for sixty years and has accompanied him on mathematical sojourns from Florida to Israel. "Tell me, what is this about?" she asked me, flipping through her copy of Erdös's book *The Art of Counting*. "It looks like Chinese. Also, tell me, how famous and brilliant is he? I know so little about him. He once looked up six phone numbers. Then we talked for half an hour before he phoned them all, from memory. More than all his scientific work, that impressed me."

For Erdös, Graham, and their colleagues, mathematics is order and beauty at its purest, order that transcends the physical world. When Euclid, the Greek geometer of the third century B.C., spoke of points and lines, he was speaking of idealized entities, points that have no dimension and lines that have no width. All points and lines that exist in the real world—in, say, physics or engineering—do have dimension and thus are only imperfect imitations of the pure constructs that geometers ponder. Only in this idealized world do the angles of every triangle always sum to precisely 180 degrees.

Numbers, too, can have this transcendent quality. Take the prime numbers, integers like 2, 3, 5, 7, 11, 13, and 17, which are evenly divisible only by themselves and the number 1. We happen to have ten fingers, and our number system is conveniently based on ten digits. But the same primes, with all the same properties, exist in any number system. If we had twenty-six fingers and constructed our number system accordingly, there would still be primes. The universality of primes is the key to Carl Sagan's novel *Contact*, in which extraterrestrials, with God only knows how many fingers, signal earthlings by emitting radio signals at prime-number frequencies. But little green men need not be invoked in order to conceive of a culture that doesn't use base 10. We have had plenty here on Earth. Computers use a binary system, and the Babylonians had a base-60 system, vestiges of which are evident in the way we measure time (sixty seconds in a minute, sixty minutes in an hour). Cumbersome as this sexagesimal system was, it too contained the primes.

Prime numbers are like atoms. They are the building blocks of all integers. Every integer is either itself a prime or the unique product of primes. For example, 11 is a prime; 12 is the product of the primes 2, 2, and 3; 13 is a prime; 14 is the product of the primes 2 and 7; 15 is the product of the primes 3 and 5, and so on. Some 2,300 years ago, in proposition 20 of Book IX of his *Elements*, Euclid gave a proof, "straight from the Book," that the supply of primes is inexhaustible. As of this writing, the largest known prime is a 65,050-digit number formed by raising 2 to the 216,091st power and subtracting 1. But Euclid's work shows that there are infinitely many others. Only in mathematics, of all the sciences, do the ancients occasionally have the final word.

Prime numbers have always had an almost mystical appeal. "I even know of a mathematician who slept with his wife only on prime-numbered days," Graham says. "It was pretty good early in the month—two, three, five, seven—but got tough toward the end, when the primes are thinner, nineteen, twenty-three, then a big gap till twenty-nine." Prime numbers are appealing because, in spite of their apparent simplicity, their properties are extremely elusive. All sorts of basic questions about them remain unanswered, even though they have been scrutinized by generations of the sharpest mathematical minds. In 1742, for example, Christian Goldbach conjectured that every even number greater than 2 is the sum of two primes: $4 = 2 + 2$, $6 = 3 + 3$, $8 = 5 + 3$, $10 = 5 + 5$, $12 = 7 + 5$, $14 = 7 + 7$, and so on. With the aid of computers, twentieth-century mathematicians have decomposed all even numbers up to 100 million into the sum of two primes, but they have not been able to prove that Goldbach's simple conjecture is universally true. Similarly, computer searches have revealed numerous "twin primes," pairs of consecutive odd numbers both of which are prime: 3 and 5; 5 and 7; 11 and 13; 71 and 73; 1,000,000,000,061 and 1,000,000,000,063. Number theorists believe that the supply of twin primes is inexhaustible, like the supply of primes themselves, but no one has been able to prove this. On an even deeper level, no one has found an easy way of telling in advance how far one prime number will be from the next one.

The prime numbers are Erdös's intimate friends. He understands them better than anyone else does. "When I was ten," he says, "my father told me about Euclid's proof, and I was hooked." Seven years later, as a college freshman, he caused a stir in Hungarian mathematics circles with a simple proof that a prime can always be found between any integer (greater than 1) and its double. This result had already been proved in about 1850 by one of the fathers of Russian mathematics, Pafnuty Lvovitch Chebyshev. But Chebyshev's proof was too heavy-handed to be in the Book. He had used a steam shovel to transplant a rosebush, whereas Erdös managed with a silver spoon. News of Erdös' youthful triumph was spread by the ditty "Chebyshev said it, and I say it again/ There is always a prime between *n* and *2n*."

In 1939 Erdös attended a lecture at Princeton by Marc Kac, a Polish émigré mathematical physicist who would contribute to the American development of radar during the Second World War. "He half-dozed through most of my lecture," Kac wrote in his autobiography. "The subject matter was too far removed from his interests. Toward the end I described briefly my difficulties with the number of prime divisors. At the mention of number theory Erdös perked up and asked me to explain once again what the difficulty was. Within the next few minutes, even before the lecture was over, he interrupted to announce that he had the solution!"

In 1949 Erdös had his greatest victory over the prime numbers, although the victory is one he doesn't like to talk about, because it was marred by controversy. Although mathematicians have no effective way of telling exactly where prime numbers lie, they have known since 1896 a formula that describes the statistical distribution of primes, how on average the primes thin out the further out you go. Like Chebyshev's proof, the 1896 proof of what's called the Prime Number Theorem depended on heavy machinery, and the brightest mathematical minds were convinced that the theorem couldn't be proved with anything less. Erdös and Atle Selberg, a colleague who was not yet well known, stunned the mathematics world with an "elementary" proof. According to Erdös's friends, the two agreed that they'd publish back-to-back papers in a leading journal delineating their respective contributions to the proof. Erdös then sent out postcards to mathematicians informing them that he and Selberg had conquered the Prime Number Theorem. Selberg apparently ran into a mathematician he didn't know who had received a postcard, and the mathematician immediately said, "Have you heard? Erdös and What's His Name have an elementary proof of the Prime Number Theorem." Reportedly, Selberg was so injured that he raced ahead and published without Erdös, and thus got the lion's share of credit for the proof. In 1950 Selberg alone was awarded the Fields medal, the closest equivalent in mathematics to a Nobel Prize, in large part for his work on the Prime Number Theorem.

Priority fights are not uncommon in mathematics. Unlike other scientists, mathematicians leave no trail of laboratory results to substantiate who did what. Indeed, Erdös has been spending much time these days mediating a priority fight among three of his closest collaborators. "When I was a graduate student," Joel Spencer says, "I thought only third-rate mathematicians would have these fights. But it's actually first-rate mathematicians. They're the ones who are passionate about mathematics." If they can't fathom what's in the SF's Book, they don't want anyone else to. The late R. L. Moore, a strong Texas mathematician, put it bluntly: "I'd rather a theorem not be thought of than I not be the one who thinks of it."

In February, Erdös and 320 of his colleagues gathered at Florida Atlantic University, in Boca Raton, for the largest conference ever in combinatorics, a burgeoning branch of mathematics that encompasses problems involving objects that must be counted and classified. (Combinatorics was officially launched in 1736 in the East Prussian city of Königsberg, now the Soviet town of Kaliningrad, when Leonhard Euler, a twenty-nine-year-old mathematical phenom, proved that one couldn't take a round-trip stroll across all of the city's seven bridges without crossing at least one bridge more than once, and then generalized his argument to apply to any odd number of bridges.) At Boca Raton one of the combinatorialists gave a formal talk in which he presented a result but refused to share the proof. The proof apparently introduced a powerful technique that he wanted to keep secret until he had squeezed it dry of whatever other results it might yield.

ERDÖS DOESN'T LIKE TO THINK ABOUT SUCH COMpetitiveness. For him mathematics is a glorious combination of science and art. On the one hand, it is the science of certainty, because its conclusions are logically unassailable. Unlike biologists, chemists, or even physicists, Erdös, Graham, and their fellow mathematicians *prove* things. Their conclusions follow syllogistically from premises, in the same way that the conclusion "Ronald Reagan is mortal" follows from the premises "All Presidents are mortal" and "Ronald Reagan is a President." On the other hand, mathematics has an aesthetic side. A conjecture can be "obvious" or "unexpected." A result can be "trivial" or "beautiful." A proof can be "messy," "surprising," or, as Erdös would say, "straight from the Book."

What is more, a proof should ideally provide insight into why a particular result is true. Consider one of the most famous results in modern mathematics, the four-color-map theorem, which states that no more than four colors are needed to paint any conceivable flat map of real or imaginary countries in such a way that no two bordering countries have the same color. From the middle of the nineteenth century most mathematicians believed that this seductively simple theorem was true, but for 124 years a parade of distinguished mathematicians and dedicated amateurs searched in vain for a proof (or, conceivably, a counterexample). In 1976 Kenneth Appel and Wolfgang Haken, of the University of Illinois, finally conquered this mathematical Mount Everest. I was an undergraduate at Harvard at the time, and when word of the proof reached Cambridge, my instructor in calculus cut short his lecture and served champagne. Some days later we learned to our dismay that Appel and Haken's proof had made unprecedented use of high-speed computers: more than 1,000 hours logged among three machines. What Appel and Haken had done was to demonstrate that all possible maps are variations of more than 1,500 fundamental cases, each of which the computer was then able to paint using at most four colors. The proof was simply too long to be checked by hand, and some mathematicians feared that the computer might have slipped up and made a subtle error. Today, more than a decade later, the validity of the proof is generally acknowledged, but many still regard the proof as unsatisfactory. "I'm not an expert on the four-color problem," Erdös says, "but I assume the proof is true. However, it's not beautiful. I'd prefer to see a proof that gives insight into why four colors are sufficient."

Beauty and *insight*—these are words that Erdös and his colleagues use freely but have difficulty explaining. "It's like asking why Beethoven's Ninth Symphony is beautiful," Erdös says. "If you don't see why, someone can't tell you. I *know* numbers are beautiful. If they aren't beautiful, nothing is."

Pythagoras of Samos evidently felt the same way. In the sixth century B.C. he made a kind of religion out of numbers, believing that they were not merely instruments of enumeration but sacred, perfect, friendly, lucky, or evil. Pythagoras saw perfection in any integer that equaled the sum of all the other integers that divided evenly into it. The first perfect number is 6. It's evenly divisible by 1, 2, and 3, and it's also the sum of 1, 2, and 3. The second perfect number is 28. Its divisors are 1, 2, 4, 7, and 14, and they add up to 28. During the Middle Ages religious scholars asserted that the perfection of 6 and 28 was part of the fabric of the universe: God created the world in six days and the moon orbits the earth every 28 days. Saint Augustine believed that the properties of the numbers themselves, not any connection to the empirical world, made them perfect: "Six is a number perfect in itself, and not because God created all things in six days; rather the inverse is true; God created all things in six days because this number is perfect. And it would remain perfect even if the work of the six days did not exist."

The ancient Greeks knew of only two perfect numbers besides 6 and 28: 496 and 8,128. Since the four perfect numbers they knew were all even, they wondered whether an odd perfect number existed. Today Erdös and his colleagues know thirty perfect numbers, the largest having 130,100 digits, and all thirty are even. But they cannot rule out the possibility that the thirty-first perfect number will be odd. Whether an odd perfect number exists is among the oldest unsolved problems in mathematics. Equally daunting is the unsolved problem of how many perfect numbers there are.

Pythagoras considered the numbers 220 and 284 to be "friendly." His concept of a friendly number was based on the idea that a human friend is a kind of alter ego. Pythagoras wrote, "[A friend] is the other I, such as are 220 and 284." These numbers have a special mathematical property: each is equal to the sum of the other's divisors. That is, the divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55, and 110, and they sum to 284; the divisors of 284 are 1, 2, 4, 71, and 142, and they sum to 220. Like perfect numbers, friendly numbers appear in the Bible. In Genesis 32:14, Jacob gives Esau 220 goats ("two hundred she-goats and twenty he-goats") as a gesture of friendship.

A second pair of friendly numbers (17,296 and 18,416) was not discovered until 1636, by Pierre de Fermat. By the middle of the nineteenth century many able mathematicians had searched for pairs of friendly numbers, and some sixty had been found. But not until 1866 was the second *smallest* pair, 1,184 and 1,210, discovered, by a sixteen-year-old Italian. By now hundreds of friendly numbers have been discovered, but, as with perfect numbers and twin primes, even today no one knows whether their supply is inexhaustible. Erdös thinks it is, and he wrote one of the earliest papers in the literature on the distribution of friendly numbers. Why it should be so much easier to prove that the number of primes is infinite is one of the great unanswered meta-questions of mathematics.

Perfect numbers and friendly numbers are among the areas of mathematics in which child prodigies tend to show their stuff. Like chess and music, such areas do not require much technical expertise. No child prodigies exist among historians or legal scholars, because years are needed to master those disciplines. A child can learn the rules of chess in a few minutes, and native ability takes over from there. So it is with areas of mathematics like these, which are aspects of elementary number theory, or the study of the integers, and combinatorics. You can easily explain prime numbers, perfect numbers, and friendly numbers to a child, and he can start playing around with them and exploring their properties. Many areas of mathematics, however, require technical expertise, which is acquired over years of assimilating definitions and previous results. By the time mathematical prodigies mature and enter college, they usually have the patience to master these more technical areas—and often go on to make great discoveries in them. Erdös is an exception. He has stuck chiefly to areas of mathematics in which prodigies excel.

This is not to say that his mathematical interests are narrow. On the contrary, he has opened up whole new areas of mathematics. But, like number theory, these areas typically require a minimum of technical knowledge. These are areas that the next generation of prodigies will find captivating.

Erdös's forte is coming up with short, clever solutions. He solves problems not by grinding out pages of equations but by constructing succinct, insightful arguments. He is a mathematical wit, and his shrewdness often extends to problems outside his areas of specialty. "In 1976 we were having coffee in the mathematics lounge at Texas A & M," recalls George Purdy, a geometer who has worked with Erdös since 1967. "There was a problem on the blackboard in functional analysis, a field Erdös knew nothing about. I happened to know that two analysts had just come up with a thirty-page solution to the problem and were very proud of it. Erdös looked up at the board and said, 'What's that? Is it a problem?' I said yes, and he went up to the board and squinted at the tersely written statement. He asked a few questions about what the symbols represented, and then he effortlessly wrote down a two-line solution. If that's not magic, what is?"

Erdös is the consummate problem solver. Most elderly mathematicians, if they're still going strong, are theory builders. They have stopped solving problems and are setting a general agenda for mathematical research, pointing to new or neglected areas that younger talent should pursue. Not Erdös. As long as problems remain to be solved, he'll be slugging it out in the trenches.

ONE OF THE AREAS IN WHICH ERDÖS HAS PIONEERED is a philosophically appealing aspect of combinatorics called Ramsey theory. It is the area in which Graham's record-setting number comes into play. The idea underlying Ramsey theory is that complete disorder is an impossibility. The appearance of disorder is really a matter of scale. Any mathematical "object" can be found if sought in a large enough universe. "In the TV series *Cosmos*, Carl Sagan appealed to Ramsey theory without knowing that's what he was doing," Graham says. "Sagan said people often look up and see, say, eight stars that are almost in a straight line. Since the stars are lined up, the temptation is to think that they were artificially put there, as beacons for an interstellar trade route, perhaps. Well, Sagan said, if you look at a large enough group of stars, you can see almost anything you want. That's Ramsey theory in action."

In Sagan's example the mathematician would want to know the smallest group of arbitrarily positioned stars that will always contain eight that are lined up. In general, the Ramsey theorist seeks the smallest "universe" that's guaranteed to contain a certain object. Suppose the object is not eight stars in a row but two people of the same sex. In this case the Ramsey theorist wants to know the smallest number of people that will always include two people of the same sex. Obviously, the answer is three.

Ramsey theory takes its name from Frank Plumpton Ramsey, a brilliant student of Bertrand Russell, G. E. Moore, Ludwig Wittgenstein, and John Maynard Keynes, who might well have surpassed his teachers had he not died of jaundice in 1930, at the age of twenty-six. While his brother Michael pursued the transcendent reality that theology offers (he became the Archbishop of Canterbury), Frank Ramsey, a spirited atheist, pursued the transcendent reality that mathematics offers. He also studied philosophy and economics, writing two papers on taxation and savings that were heralded by Keynes and are still widely cited in the economics literature. But it is eight pages of mathematics that have made him eponymous—eight pages that Erdös seized on and developed into a full-fledged branch of mathematics. Like all the problems Erdös works on, Ramsey problems can be simply stated, although the solutions are often hard to come by.

The classic Ramsey problem involves guests at a party. What is the minimum number of guests that need to be invited so that either at least three guests will know each other or at least three won't? Mathematicians, as is their trademark, are careful to articulate their assumptions. Here they assume that the relation of knowing someone is symmetric: if Sally knows Billy, Billy knows Sally.

With this assumption in mind, consider a party of six. Call one of the guests David. Now, since David knows or doesn't know each of the other five, he will either know at least three of them or not know at least three. Assume the former (the argument works the same way if we assume the latter). Now consider what relationships David's three acquaintances might have among themselves. If any two of the three are acquaintances, they and David will constitute three who know each other—and we have our quorum. That leaves only the possibility that David's three aquaintances are all strangers to one another—but that achieves the quorum too, for they constitute three guests who do not know each other. To understand why a party of five is not enough to guarantee either three people all of whom know each other or three people none of whom do, ponder the case of Michael, who knows two and only two people, each of whom knows a different one of the two people Michael doesn't know.

Q.E.D., or *quod erat demonstrandum*, as Erdös would say. We have just written out a mathematical proof—perhaps not one from the Book, but a proof nonetheless. And the proof provides *insight* into why a party of six must include at least three mutual acquaintances or three mutual strangers. Another way to prove this is by brute force, listing all conceivable combinations of acquaintanceship among six people—32,768 such possibilities exist—and checking to see that each combination includes the desired relationship. This brute-force proof, however, would not provide insight.

Suppose we want not a threesome but a foursome who either all know each other or are strangers. How large must the party be? Erdös and Graham and their fellow Ramsey theorists can prove that eighteen guests are necessary. But raise the ante again, to a fivesome, and no one knows how many guests are required. The answer is known to lie between forty-two and fifty-five. That much has been known for two decades, and Graham suspects that the precise number won't be found for at least a hundred years. The case of a sixsome is even more daunting, with the answer known to lie between 102 and 169. The ranges grow wider still for higher numbers.

Erdös likes to tell the story of an evil spirit that can ask you anything it wants. If you answer incorrectly, it will destroy humanity. "Suppose," Erdös says, "it decides to asks you the Ramsey party problem for the case of a fivesome. Your best tactic, I think, is to get all the computers in the world to drop what they're doing and work on the problem, the brute-force approach of trying all the specific cases"—of which there are more than 10 to the 200th power (the number 1 followed by 200 zeros). "But if the spirit asks about a sixsome, your best survival strategy would be to attack the spirit before it attacks you. There are too many cases even for computers."

Graham's record-setting number comes up in a similar problem. Take any number of people and list every possible committee that could be formed from them, including committees of one and a committee of the whole. The "object" Graham wants to find is four committees that can be split into two groups of two committees each in such a way that each person belongs to the same number of committees in each group. How many people are required to guarantee the presence of four such committees? Graham suspects that the answer is six, but all that he or anyone else has been able to prove is that four such committees will always exist if the number of people is equal to his record-setting number. This astonishing gap between what is suspected, based on observations of specific cases, and what is known shows how hard Ramsey theory is.

Graham, whose license plate reads RAMSEY, thinks that centuries may pass before much of Erdös's and his work in Ramsey theory has applications in physics, engineering, or elsewhere in the real world, including his place of employment, AT&T. "The applications aren't the point," Graham says. "I look at mathematics pretty globally. It represents the ultimate structure and order. And I associate doing mathematics with control. Jugglers like to be able to control a situation. There's a well-known saying in juggling: 'The trouble is that the balls go where you throw them.' It's just you. It's not the phases of the moon, or someone else's fault. It's like chess. It's all out in the open. Mathematics is really there, for you to discover. The Prime Number Theorem was the same theorem before people were here, and it will be the same theorem after we're all gone. It's the Prime Number Theorem."

"In a way," Erdös says, "mathematics is the only infinite human activity. It is conceivable that humanity could eventually learn everything in physics or biology. But humanity certainly won't ever be able to find out everything in mathematics, because the subject is infinite. Numbers themselves are infinite. That's why mathematics is really my only interest." One can reconstruct chapters of the SF's Book, but only the SF has it from beginning to end.

"The trouble with the integers is that we have examined only the small ones," says Graham. "Maybe all the exciting stuff happens at really big numbers, ones we can't get our hands on or even begin to think about in any very definite way. So maybe all the action is really inaccessible and we're just fiddling around. Our brains have evolved to get us out of the rain, find where the berries are, and keep us from getting killed. Our brains did not evolve to help us grasp really large numbers or to look at things in a hundred thousand dimensions. I've had this image of a creature, in another galaxy perhaps, a child creature, and he's playing a game with his friends. For a moment he's distracted. He just thinks about numbers, primes, a simple proof of the twin-prime conjecture, and much more. Then he loses interest and returns to his game."

We earthlings, where are we in our understanding of numbers? Each result—say, Erdös's proof that a prime can always be found between an integer and its double—although touted in the mathematics journals, is only an imperceptible advance toward some kind of cosmic understanding of the integers. "It will be millions of years before we'll have any understanding," Erdös says, "and even then it won't be a complete understanding, because we're up against the infinite."

IT IS LATE JANUARY IN SAN ANTONIO, AND MAYOR HENRY Cisneros, a rising star in Democratic politics, has proclaimed Math Day, in honor of the 2,575 mathematicians who have descended on the city for the annual conferences of the American Mathematical Society and the Mathematical Association of America. Cisneros's gesture has not advanced his cause with the conferees I am with, who wonder whether he has ever met a mathematician, let alone heard of Paul Erdös. The schedules include meetings to discuss whether mathematicians should accept Star Wars money and whether the National Security Agency, whose code-cracking wing is the largest employer of mathematicians in the United States, qualifies for corporate membership in the AMS. But except for a few zealots, most of the mathematicians have come to San Antonio not to discuss ethics and politics but to do mathematics. At physics conferences or psychoanalytic meetings, the participants do not perform experiments on subatomic particles or practice psychotherapy—they just talk about it. At mathematics conferences the attendees actually do mathematics, on blackboards, napkins, placemats, and toilet-stall walls, and in their minds.

Erdös rarely attends the scheduled talks at these meetings, preferring to work simultaneously with several mathematicians in a hotel room. Today Erdös has taken over someone else's room at the Marriott and is working on six problems with six different mathematicians, who are sprawled across two double beds and the floor. "What about 647? Is it a prime?" asks a man who looks like a plump Moses. "I can no longer do them in my head." A woman in a multicolored dress comes to his rescue by pulling out a 276-page printout of all the primes up to two million—148,933 of them, ranging from 2 to 1,999,993. Sure enough, 647 is on the list.

Erdös doesn't seem to be paying attention. He is slumped over in a chair, his head in his hands, like an invalid in a nursing home. But every few minutes he perks up and suggests a line of attack to one of his colleagues, who then scrambles to implement the master's suggestion. The others wait patiently for Erdös to have a flash of insight about their problem. Sometimes when Erdös raises his head, he fools them, and they lean forward like the people seeking hot tips in an E. F. Hutton commercial. Instead of sharing a mathematical inspiration, he utters an aphoristic statement having to do with death—"Soon I will be cured of the incurable disease of life" or "This meeting, like life, will soon come to an end, but the meeting was much more pleasant"—and then bows his head again. No one picks up on these comments, and the cycle of mathematical insights and reflections on death continues all morning.

"In ten years," says the man who looks like Moses, "I want you to talk to the SF on my behalf."

"What do you want from the SF?" Erdös says.

"I want to see the Book."

"No one ever sees the Book. At most, you get glimpses."

Moses turns on the TV. "Television," Erdös says, "is something the Russians invented to destroy American education." The news comes on, and Ronald Reagan fills the screen. "Eisenhower was an enthusiastic but not very good golfer," Erdös says. "Someone said at the time that it was okay to elect a golfer, but why not a good golfer? I say, it's okay to elect an actor, but why not a good actor, like Chaplin?" Reagan dissolves, and the newscast switches to a story about AIDS. "Both bosses and slaves tell me people are less promiscuous," Erdös says, "but I wouldn't know." When the conversation strays from mathematics and death, it's a sure sign that Erdös is bored and ready to find new mathematical soul mates.

Two hours and five milligrams of Benzedrine later, Erdös is on a flight to Newark. From there he'll be going in quick succession to Memphis, Boca Raton, San Juan, Gainesville, Haifa, Tel Aviv, Montreal, Boston, Madison, DeKalb, Chicago, Champaign, Philadelphia, and Graham's house. His schedule has a small problem, however: two mathematicians in different states want him to open his brain to them at the same time. "You've heard about my mother's theorem?" Erdös says. "My mother said, 'Even you, Paul, can be in only one place at one time.' Maybe soon I will be relieved of this disadvantage. Maybe, once I've left, I'll be able to be in many places at the same time. Maybe then I'll be able to collaborate with Archimedes and Euclid." □