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Paul Erdos, a Math Wayfarer At Field's Pinnacle, Dies at 83

By GINA KOLATA

Dr. Paul Erdos, a legendary mathematician who was so devoted to his subject that he lived as a mathematical pilgrim with no home and no job, died Friday in Warsaw, Poland. He was 83.

The cause of death was a heart attack, according to an E-mail message sent out this weekend by Dr. Miki Simonovits, a mathematician at the Hungarian Academy of Sciences, who was a close friend.

Erdos (pronounced AIR-dosh) was attending a mathematics meeting in Warsaw when he died, Simonovits reported.

The news, only now reaching the world's mathematicians, has come as a blow. Dr. Ronald L. Graham, the director of the information sciences research center at AT&T Laboratories, said, "I'm getting E-mail messages from around the world, saying, 'Tell me it isn't so.' "

Never, mathematicians say, has there been an individual like Paul Erdos. He was one of the century's greatest mathematicians, who posed and solved thorny problems in number theory and other areas and founded the field of discrete mathematics, which is the foundation of computer science. He was also one of the most prolific mathematicians in history, with more than 1,500 papers to his name. And, his friends say, he was also one of the most unusual.

Erdos, "is on the short list for our century," said Dr. Joel H. Spencer, a mathematician at New York University's Courant Institute of Mathematical Sciences.

Graham said, "He's among the top 10."

Dr. Ernst Straus, who worked with both Albert Einstein and Erdos, wrote a tribute to Erdos shortly before his own death in 1983. He said of Erdos: "In our century, in which mathematics is so strongly dominated by 'theory doctors,' he has remained the prince of problem solvers and the absolute monarch of problem posers."

Erdos, Straus continued, is "the Euler of our time," referring to the great 18th-century mathematician, Leonhard Euler, whose name is spoken with awe in mathematical circles.

Stooped and slight, often wearing socks and sandals, Erdos stripped himself of all the quotidian burdens of daily life: finding a place to live, driving a car, paying income taxes, buying groceries, writing checks. "Property is nuisance," he said.

Concentrating fully on mathematics, Erdos traveled from meeting to meeting, carrying a half-empty suitcase and staying with mathematicians wherever he went. His colleagues took care of him, lending him money, feeding him, buying him clothes and even doing his taxes. In return, he showered them with ideas and challenges -- with problems to be solved and brilliant ways of attacking them.

Dr. Laszlo Babai of the University of Chicago, in a tribute written to celebrate Erdos' 80th birthday, said that Erdos' friends "care for him fondly, repaying in small ways for the light he brings into their homes and offices."

Mathematicians like to brag about their connections to Erdos by citing their "Erdos number." A person's Erdos number was 1 if he or she had published a paper with Erdos. It was 2 if he or she had published with someone who had published with Erdos, and so on.

At last count, Erdos had 458 collaborators, Graham said. An additional 4,500 mathematicians had an Erdos number of 2, Graham added. He said so many mathematicians were still at work on problems they had begun with Erdos that another 50 to 100 papers with Erdos' name on them were expected to be published after his death.

Graham, whose Erdos number is 1, handled Erdos' money for him, setting aside an "Erdos room" in his house for the chore. He said Erdos had given away most of the money he earned from lecturing at mathematics conferences, donating it to help students or as prizes for solving problems he had posed. Erdos left behind only $25,000 when he died, Graham said, and he plans to confer with other mathematicians about how to give it away to help mathematics.

Graham said Erdos' "driving force was his desire to understand and to know." He added, "You could think of it as Erdos' magnificent obsession. It determined everything in his life."

"He was always searching for mathematical truths," said Spencer, of New York University, who also has an Erdos number of 1. He added: "Erdos had an ability to inspire. He would take people who already had talent, that already had some success, and just take them to an entirely new level. His world of mathematics became the world we all entered."

Born in Hungary in 1913, Erdos was a cosseted mathematical prodigy. At age 3, Graham said, Erdos discovered negative numbers for himself when he subtracted 250 degrees from 100 degrees and came up with 150 degrees below zero. A few years later, he amused himself by solving problems he had invented, like how long would it take for a train to travel to the sun.

Erdos had two older sisters who died of scarlet fever a few days before he was born, so his mother became very protective of him. His parents, who were mathematics teachers, took him out of public school after just a few years, Graham said, and taught him at home with the help of a German governess. And, Graham said, Erdos' mother coddled him. "Erdos had never buttered his own toast until he was 21 years old," Graham said. He never married and left no immediate survivors.

When Erdos was 20, he made his mark as a mathematician, discovering an elegant proof for a famous theorem in number theory. The theorem, Chebyshev's theorem, says that for each number greater than one, there is always at least one prime number between it and its double. A prime number is one that has no divisors other than itself and 1.

Although his research spanned a variety of areas of mathematics, Erdos kept up his interest in number theory for the rest of his life, posing and solving problems that were often simple to state but notoriously difficult to solve and that, like Chebyshev's theorem, involved relationships between numbers.

"He liked to say that if you can state a problem in mathematics that's unsolved and over 100 years old, it is probably a problem in number theory," Graham said.

Erdos, like many mathematicians, believed that mathematical truths are discovered, not invented. And he had an evocative way of conveying that notion. He spoke of a Great Book in the sky, maintained by God, that contained the most elegant proofs of every mathematical problem. He used to joke about what he might find if he could just have a glimpse of that book.

He would also muse about the perfect death. It would occur just after a lecture, when he had just finished presenting a proof and a cantankerous member of the audience would have raised a hand to ask, "What about the general case?" In response, Erdos used to say, he would reply, "I think I'll leave that to the next generation," and fall over dead.

Erdos did not quite achieve his vision of the perfect death, Graham said, but he came close.

"He died with his boots on, in hand-to-hand combat with one more problem. It was the way he wanted to go," Graham said.

Other Places of Interest on the Web

- The Erdös Number Project
- Paul Erdos: The Wandering Mathematician
- David Hilbert and Paul Erdös Awards

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