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Atle Selberg, 90, Lauded Mathematician, Dies

By JEREMY PEARCE

Atle Selberg, a mathematician whose theoretical work on the properties of numbers was recognized with the Fields Medal and other major prizes, died Aug. 6 at his home in Princeton, N.J. He was 90.

The cause was heart failure, his family said.

As a young mathematician, Dr. Selberg was first widely recognized for a major contribution to the study of prime numbers, which are evenly divisible only by 1 and themselves.

Mathematicians had already proved a fundamental theorem describing the distribution of prime numbers among whole numbers. In 1948, he and Paul Erdos, a prominent Hungarian mathematician, each came up with key concepts in developing a simpler version of the proof and avoiding analytical techniques involving complex numbers. However, the two squabbled for years over the apportionment of credit for the proof. Dr. Selberg published his proof in the Annals of Mathematics in 1949.

In 1950, the International Mathematical Union cited Dr. Selberg's proof and other work in awarding him the Fields Medal, often called the Nobel Prize of mathematics, which cites promising mathematicians 40 or younger. The next year, Dr. Selberg was named a professor of mathematics at the Institute for Advanced Study in Princeton, where he continued his research for the rest of his career.

Dr. Selberg also developed the Selberg trace formula, which relates the geometry of certain types of surfaces to the frequencies at which they can vibrate, somewhat like the way the shape of a drum determines the sounds it can make. The formula was a keystone in modern research in number theory and related fields, and led to discoveries of unexpected and subtle connections between the properties of numbers, especially prime numbers, and those of geometric surfaces. He explained the formula in a 1956 paper that was published in the Journal of the Indian Mathematical Society.

J. Brian Conrey, a number theorist and executive director of the American Institute of Mathematics, said the trace formula became a fundamental lever that "opened the door to whole other fields of mathematical analysis."

Because of the high level of abstraction inherent in his kind of research, Dr. Selberg expressed concern that specialists in the field could become isolated from their peers and the public. "Where there is a high degree of involvement in something that seems too remote from everyday life, there may sometimes emerge a type of person somewhat out of touch with reality," he said in an interview in The New York Times in 1966. "Or at least with what other people consider reality."

In visits to the American Institute of Mathematics in Palo Alto, Calif., he liked to gather mathematicians together for lunch, conversation and a spirited game of boccie, Dr. Conrey said.

In the 1940s, he developed a powerful method for separating nonprime numbers from prime numbers. Such methods, called sieves, date back to Eratosthenes of Cyrene, a scholar in the third century B.C. In the sieve of Eratosthenes, one sifts out the prime numbers by crossing out higher multiples of a prime number. For

example, 2 is prime, but that means higher multiples of 2 (that is, 4, 6, 8, etc.) are not prime since they are divisible by 2.

Dr. Selberg's sieve, which assigns a score to each number in a way that prime numbers tend to have high scores and nonprime numbers low scores, "remains perhaps the most powerful sieving method known" and "is still very much a modern tool," said Peter Sarnak, a professor of mathematics at both Princeton University and the Institute for Advanced Study.

The son of a mathematician, Atle Selberg (his first name was pronounced AHT-luh) was born in Langesund, Norway. He received his doctorate in mathematics from the University of Oslo in 1943.

In 1986, Dr. Selberg shared the Wolf Foundation Prize in Mathematics with Samuel Eilenberg.

He retired from the institute in 1987, and became an American citizen in the 1990s.

Dr. Selberg is survived by his wife, the former Betty Compton. His first wife, Hedvig Liebermann, a researcher at the institute and Princeton's Plasma Physics Laboratory, died in 1995.

He is also survived by a son, Lars, of Middlefield, Conn.; a daughter, Ingrid, of London; and four grandchildren.