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Yale "Father of Fractals" to be Awarded Prestigious Prize in Japan

New Haven, Conn. — Benoit Mandelbrot, Sterling Professor of Mathematical Sciences at Yale University, has been awarded the very prestigious Japan Prize by The Science and Technology Foundation of Japan.

The international prize recognizes "original and outstanding achievements that contribute to the progress of science and technology and the promotion of peace and prosperity of mankind."

Mandelbrot is known internationally as the "father of fractals," and, in 1993, the Wolf Prize for Physics cited him for "having changed our view of nature." Michael V. Berry (the Bristol physicist) wrote that "fractal geometry is one of those concepts which at first sight invites disbelief but on second thought becomes so natural that one wonders why it has only recently been developed." John Wheeler (the Princeton physicist) wrote that "no one will be considered scientifically literate tomorrow who is not familiar with fractals."

The prize will be awarded in the presence of the Emperor of Japan on April 25, 2003, during a festive "Japan Prize Week," which will begin April 21, 2003. The Japan Prize has been awarded each year since 1985 in two fields. This year, one of the $400,000 awards will be shared by Benoit Mandelbrot and Professor James York of the University of Maryland, under the category of "Science and Technology of Complexity." The second prize category is "Visualizing Techniques in Medicine."

"Fifty years ago, when I began to study complexity for its own sake, I was very lonely," Mandelbrot said. "Today, it is the theme of this great prize and I am utterly delighted to be chosen as a recipient. Early on, I became a wanderer-by-choice between the disciplines, and between theory and applications. Electing to live as a constant maverick, I allowed my interests to move in and out of mathematics, in and out of physics, of economics, or diverse other fields of physical and social sciences, and even music and art. I showed that very simple formulas can generate objects that exhibit an extraordinary wealth of structure. Lately, I have also been very active in college and high school education. I feel extraordinarily privileged that my professional life has continued long enough to allow me to merge every one of my activities into a reasonable beginning of a science of roughness."

Studying diverse shapes in nature and culture, Mandelbrot saw that the overwhelming smoothness paradigm with which mathematical physics had attempted to describe Nature was radically flawed and incomplete. He also discovered that many cases of roughness can be called "pure," insofar as they show the same pattern on all scales. To handle those phenomena, he identified or created suitable mathematical tools, coined the term "fractal" to denote those objects, and created an entirely new system of geometry. He startled scientists, mathematicians and artists alike by unveiling a dramatic new approach for describing what had previously seemed indescribable. His revolutionary new paradigm was described as having revealed order and simplicity in systems with a seemingly high degree of disorder, irregularity, and complexity.

Examples of fractals include coastlines, clouds, tree branches, clusters of galaxies and of physical particles, blood vessels, and the fluctuations in the stock market. As a result, his multidisciplinary work has influenced statistical physics and also fields as diverse as graphic design, astronomy, meteorology and computer science. In economics a contrast is now drawn between "Brownian" and "Mandelbrotian" models.

He also is credited with reintroducing the eye and experimentation to the study of mathematics. His many purely mathematical conjectures (proven or unproven) led to profound insights. The best and most widely known concern the Mandelbrot set, which has been described as the most complex object in mathematics.

Computer-generated imagery of the Mandelbrot set and of fractal landscapes allowed him to bridge some chasms that

separated mathematics, science and technology from one another and from the interests of the common man and the child. This made him that rare scientist whose ideas not only have a major impact upon science, but also on the popular domain. Lynn A. Steen (mathematician at St. Olaf) wrote that “simply put, fractals enable everyone to enjoy mthematics. Nothing else can make such a striking – and important – claim.” Fractals also occur in music and Dali’s paintings.

His publications include the books “Les objets fractals” and “The Fractal Geometry of Nature.” Both books were translated into several languages (including Basque). American Scientist listed one of his books among the top 10 in mathematical/physical sciences in the 20th Century.

Born in Poland, Mandelbrot studied at the Ecole Polytechnique in Paris and the California Institute of Technology. He holds a doctorate in mathematics from the University of Paris. From 1958 to 1993, he was with IBM’s T.J. Watson Research Center in New York State, where he continues as IBM Fellow Emeritus.

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