

# **José Fernando Escobar**

*December 20, 1954 — January 3, 2004*

As someone who lived nearly half his life on borrowed time, Chepe Escobar lived it to the fullest.

Born in Manizales, Colombia, and educated in Colombia, Brazil and the United States, Chepe was given a diagnosis of terminal cancer while still a graduate student at the University of California, Berkeley. He became active in his own treatment and overcame the disease to recover completely, completing his Ph.D. degree in Mathematics from Berkeley in 1986. He went on to forge a distinguished career that led him to positions at Chicago, Indiana and Cornell and netted him an invitation to the White House in 1992 to be honored as a Presidential Faculty Fellow. He was a member of the Colombian Academy of Science, and held an honorary degree from the Universidad del Valle in Colombia, where he frequently was a visitor. He held visiting positions as well at the Instituto de Matemática Pura e Aplicada (IMPA) in Brazil, the Courant Institute of Mathematical Sciences at NYU, the Mittag-Leffler Institute in Sweden, the University of Warwick in England and the Institut des Hautes Études Scientifiques (IHES) in France.

Chepe joined the Cornell faculty in 1994 as Professor of Mathematics and quickly became an active mentor of a large group of graduate students and postdoctoral fellows. His mathematical research was in differential geometry, spectral geometry and mathematical aspects of general relativity theory. Chepe was world-renown for his research; his work and ideas were highly appreciated by his peers.

Differential geometry is the area of mathematics that studies geometric problems using the methods of differential equations. The main objects studied are called “manifolds”, generalizations of ordinary two-dimensional surfaces such as the plane, the sphere and the torus. Manifolds may or may not have boundaries; the upper hemisphere of the sphere has a boundary—the equator—while the entire sphere does not. Cosmologists suspect that the entire universe forms a three-dimensional manifold without boundary. The notion of curvature, a quantitative measure of the local deviation from flatness, allows us to distinguish between manifolds. The plane has curvature zero, while a perfect sphere has constant positive curvature. Positive curvature can be seen in a piece of onion skin, which tears when you try to flatten it, while negative curvature is illustrated by the shape of a saddle, which would tend to fold rather than tear when it is flattened. A perfect sphere is the same everywhere, so its curvature is constant, whereas the surface of the earth is flatter near the poles, so its curvature varies. Although the surface

of the earth is curved, we do have maps to represent portions of the surface on a flat piece of paper. Certain maps, including the Mercator projection, have the property of being “conformal”, which means that angles on the map are equal to the corresponding angles on the earth, even though distances must inevitably be disturbed.

A fundamental problem in differential geometry is the Yamabe problem, which asks whether every manifold can be mapped conformally to a manifold of constant curvature. When Chepe began his thesis work, the Yamabe problem had recently been solved affirmatively for manifolds without boundary by a group of mathematicians including Rich Schoen, his thesis advisor. Chepe’s thesis, and much of his subsequent work, dealt with the Yamabe problem for manifolds with boundary, where there are additional difficulties to be overcome; for example, new ideas are required just to determine what conditions should hold for the boundary. Chepe was able to solve this problem in most cases, and to do so he had to introduce new methods in nonlinear partial differential equations.

As one who had come to the United States as a graduate student, Chepe had strong opinions about the treatment of international graduate students and the problems they had to overcome, often pointing out that seemingly minor changes in the local rules governing international applicants have serious consequences. He was a consistent advocate for students who were less than privileged and was particularly outspoken about those who made their careers pretending to be their advocates while often doing more harm than good. And quietly, he held strong opinions about the effects of United States policies on Latin America. Once, after returning from a visit to his family, he volunteered that things were much better in Colombia now that the United States was more concerned about the situation in Venezuela.

Chepe had many interests outside mathematics. As a youth in Colombia, he was a competitive diver, winning national and international championships. He enjoyed fine wines, cooking Colombian dishes for his friends and salsa dancing. And he loved soccer. He played in a local league while he was living in Ithaca. When his health became an issue again in the past few years, and he was for a while unable to play soccer, he made it a part of his treatment program to get a satellite TV connection so he could watch the soccer channels from Latin America. He said that watching soccer released in him the same feeling of well being he got from playing.

After serious surgery in the summer of 2000, he once again became active in his treatment, observing a strict diet and traveling to Germany for specialized care. That he recovered from this surgery was clear when he again was able to play soccer. On his last visit to his surgeon in New York, the doctor asked him for the secret of his remarkable recovery from the surgery.

In the fall of 2003, Chepe was at the very beginning of a sabbatical leave at IMPA in Rio de Janeiro, a city that he loved, when his health began to fail. Eventually he returned to Colombia, and he died there surrounded by his family and friends. He is survived by his brother, Arturo Escobar, of Chapel Hill, North Carolina, and his sister, Maria Victoria Escobar, who resides in Colombia.

*Laurent Saloff-Coste, Robert Strichartz, Louis J. Billera*