Howard Brody, an Expert in the Physics of Tennis, Dies at 83

By MARGALIT FOX AUG. 18, 2015
Professor Howard Brody of the University of Pennsylvania in an undated family photo.
Howard Brody, the world’s foremost physicist of tennis, who explored what happens when the stoppable force known as a ball meets the movable object called a racket, died on Aug. 11 in Bryn Mawr, Pa. He was 83.

The cause was complications of Parkinson’s disease, his family said.

At his death an emeritus professor of physics at the University of Pennsylvania, where he spent his entire career, Professor Brody began his professional life as a particle physicist before a chance encounter in the 1970s led him to train his eye on tennis.

With the myriad potential variations in the materials used in a racket, the tension of its strings, the composition of the court surface and the construction of the ball, to say nothing of the speed, heft and angle of the player’s limbs, tennis is made for a physicist. Professor Brody was the first to make it the object of serious scientific scrutiny.

In so doing, he created a field of inquiry whose objects of study collectively read like found poetry: “percussion centers,” “dwell times,” “asymmetric deflections,” “restitution coefficients,” “vibration nodes.”

His findings have pragmatic implications for players of all levels seeking to improve their game.

Professor Brody, who appeared often on television and radio, was a science adviser to the Professional Tennis Registry, which represents 15,000 teachers and coaches around the world, and a technical adviser to the United States Racquet Stringers Association.

An ardent amateur player, he was the author of two books for a general readership, “Tennis Science for Tennis Players” (1987) and, with Rod Cross and Crawford Lindsey, “The Physics and Technology of Tennis” (2002), as well as scores of scientific articles.

Howard M. — the M stood for nothing — Brody was born in Newark on July 11, 1932. He earned a bachelor’s degree from the Massachusetts Institute of Technology, where he played on the varsity tennis team, followed by master’s and doctoral degrees from the California Institute of Technology. He joined the Penn faculty in 1959.

Vacationing in Florida in the 1970s, Professor Brody caught sight of a Prince racket, the oversize racket designed by the engineer Howard Head and recently introduced to the market. The racket piqued his professional curiosity: Did its size make it better, and if so, how?

None of the tennis professionals he consulted knew the answer, and he resolved to find out.

In a lab filled with lasers and mirrors and oscilloscopes, Professor Brody set to work, focusing in particular on the interaction — sometimes companionable, sometimes not — between ball and racket.

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A specific area of inquiry was the racket’s percussion center, known in popular parlance as the sweet spot. The percussion center is the place on a racket’s head that, when struck, does not vibrate, creating a torque-free still point.

On oversize rackets, Professor Brody learned, the percussion center tends to reside closer to the head’s physical center, making such rackets, for many players, easier to use.

Other findings upended long-held beliefs. Professor Brody discovered, for instance, that stiffer rackets let the ball be hit with greater power than more flexible ones do. The same holds for looser strings as opposed to tighter ones.

“The less the tension in the strings, the more they deform and the larger the amount of energy they store and give back,” Professor Brody told The New York Times in 1979. “And the less the ball deforms, the less energy it loses.”

However, he added: “There’s a limit to how loose the strings should be. A butterfly net would clearly be no good.”

A longtime Philadelphia resident, Professor Brody was a member of the technical commission of the International Tennis Federation, the science committee of the United States Tennis Association and the technical advisory panel of Tennis magazine.

Professor Brody’s wife, the former Lois Chase, whom he married in 1954, died in 2011. His survivors include two daughters, Victoria Stevenson and Deirdre Bernstein; a brother, Stuart; and five grandchildren. Another daughter, Lisa Brody Foley, died in 1991.

Over the years, Professor Brody was asked whether his tennis research had improved his own game. In that respect, he replied ruefully, he was a victim of his own success.

“If I had spent as much time on the courts as I’ve spent in the lab,” he told The Philadelphia Inquirer in 1988, “I’d be a great player.”