



Professor Adrian Bejan *Received the Benjamin Franklin Medal for Mechanical Engineering*

Adrian Bejan had to find a way to cool small electronics without using traditional methods. Faced with this challenge, he discovered how to flow heat away from small electronics and follow natural pathways allowing it to escape on its own. This discovery not only keeps your laptop from overheating, it sparked an entire line of thought for Bejan about how natural systems branch and flow called “constructal theory.”

It is rather unusual for a mechanical engineer to be credited with conceiving a new theory in physics. Engineers, after all, generally specialize in coming up with new applications of physical laws, leaving the fundamental principles to the physicists. But Adrian Bejan is more than a typical engineer. Born in Romania, Bejan excelled as a mathematics prodigy from an early age. At 19, he received a scholarship to the Massachusetts Institute of Technology, where he earned his undergraduate and graduate degrees in mechanical engineering, specializing in the problems of thermodynamics—the relationships between heat and other forms of energy. After a fellowship at the University of California, Berkeley, and a faculty position at the University of Colorado, he became a full professor at Duke University in 1984, already making major contributions to the field of thermal sciences. He published several textbooks which have become seminal works in thermodynamics. In 1982, his very first book introduced the concept of entropy generation minimization, which combines heat transfer, fluid mechanics, and thermodynamics principles into simple models to facilitate engineering design. His colleagues even coined the “Bejan number” (Be) after him, a mathematical term for a certain ratio used in thermodynamics in combination with fluid mechanics. It was in 1996, however, that he published what became his most notable and daringly original work to date. At a conference a year earlier in France, he heard Nobel Laureate Ilya Prigogine discuss branching patterns found in nature, such as in trees or in the vascular systems of animals. He found himself disagreeing with Prigogine’s assertion that such phenomena were merely coincidental. Bejan was certain that there had to be an underlying principle at work that governed it all. He found that principle in what he termed “constructal theory.”

