

My Heroes

Gabor B. Levy

An impractical introvert in an ivory tower is the popular image of a scientist - anything but heroic. Yet science has many heroes. I ran into some while searching for the identities of the scientists who originated the Bouguer-Lambert-Beer Law. There is nothing overtly heroic about August Beer, except the heroic dimensions of his mother's maiden name: Maria Anna Antoinette Walburga Franciska Josefine Dupont. He was simply a successful high school science teacher turned professor. Lambert's career, however, has some heroic aspects. Born in Mulhouse as a son of a tailor a century before Beer, he could not get even a high school education. Largely self-taught, he broke through the national and social barriers of his day and ended up in Berlin as a respected scientist and a member of the Prussian Royal Academy. The documented genuine hero of this triumvirate is, however, Pierre Bouguer, mathematician and professor at Le Havre. He was one of the leaders of the heroic expedition of 1735 to Ecuador, initiated by the French Academy of Sciences.

This undertaking was truly heroic. It took some eight years to complete. Besides traversing the Atlantic under sail, traveling thousands of miles on horseback and by mule, and climbing the Andes in freezing temperatures in oxygen-poor air largely by foot, it required leadership in these dangers, which also included political turmoil and murders. Some may call this heroic scientific expedition quixotic, because the purpose was basically foolish. It was prompted by the mistaken idea of Dominique Cassini that our earth is a prolate spheroid (egg-shaped) rather than an oblate flattened spheroid as proposed by Newton, which was generally accepted by then. But the Cassinis were a powerful clan of astronomers who exerted a reactionary force through generations in French astronomy. The first Cassini moved to France in 1669 to the court of Louis XIV. He refused to accept the centuries-old heliocentric view of Copernicus. His son finally accepted it but did not embrace Kepler's work on planetary motions. Then the grandson supported the egg-shaped earth view. Because he was so influential, the Academy decided to mount the monstrous expedition to the equator in South America, to prove or disprove this theory. It was particularly foolish because they also sent an expedition to the Arctic circle, which would have sufficed. This destination was not easy either, to be sure. Those scientists had to spend a winter at extremely cold temperatures well below 100° on the scale of Celsius, who took part in the expedition. (The temperature scale we call Celsius is actually due to Christine or to Linné, who reversed the scale of Celsius, which had boiling water at zero and the freezing point at 100°.) They proved that the earth is a flattened sphere, as proposed by Newton. Unnecessary as the perilous South American expedition may have been, it does not diminish the heroism of Bouguer.

France furnished other heroes of science. Lavoisier is one of my heroes, even though he was beheaded, not so much for initiating quantitative chemistry as for being part of the establishment. Nevertheless, the intellectual majesty of his *Traité élémentaire de Chimie* is

overwhelming. Also remarkable is that many pictures show him with his wife working alongside him. It is not known whether she only recorded data and acted as his translator or whether she had any substantive scientific input. But women were excluded from science in those days, and it took genuine heroism for a woman to succeed. A prime example is Sophie Germain, a gifted mathematician. She was prevented from attending the École Polytechnique and wisely submitted her first papers to Lagrange and Gauss under the name of M. Leblanc. Only after they started corresponding as equals did she disclose her real name and sex. Even a half-century later, Sonya Kovalevsky, who moved from Russia to Berlin to study mathematics, had to take private lessons, because women were excluded from public lectures. Eventually, in 1884 she was appointed professor of mathematics in Stockholm. Marie Curie, eventually the holder of two Nobel Prizes, was initially viewed with the suspicion that she was only her husband's assistant. To this day, women have a tough time because the scientific establishment is extensively misogynous. In his *A World Without Women* (Alfred A. Knopf, New York: 1992), David Noble traces the root of this to the celibate, monastic male clergy of the Latin Middle Ages when "the glorification of God was the ultimate goal of scientific study." This may be only part of the reason, because the exclusion of women from accepted "male" pursuits is widespread in most cultures, far beyond Western Europe of the Middle Ages. Be that as it may, to this very day, women who want to do creative work in science face obstacles because of the frequent overt, and very pervasive covert, resistance. Rosalind Franklin of King's College of London University is often cited in this connection. While she may not have had the overall vision of a Watson, Crick, or Pauling, her unique X-ray studies of DNA fibers were crucial in the discovery of the double-helical structure. She felt that her boss, Maurice Wilkins, viewed her as a laboratory assistant rather than an independent researcher, as Watson put it in his biographical *Double Helix* (Atheneum, New York, 1968): "Rosy had to go or be put in her place." Crick was more generous and acknowledged her contribution, but while he, Watson, and Wilkins shared the Nobel Prize in 1962, Franklin got little credit, but of course by that time her life had been cut short. Later, Watson wrote that he came to appreciate "her personal honesty and generosity, realizing years too late the struggles that an intelligent woman faces to be accepted by the scientific world which often regards women as mere diversions from serious thinking." This is what I have tried to express here. Women in science work against great odds, and collectively, I hold them to be heroic.

Fame is ephemeral, of course. It was only by accident that great innovators such as Mendel (genetics) or Tswett (chromatography) were rediscovered. Nor is this limited to science. Even Johann Sebastian Bach in his lifetime was little known outside his own circles and was forgotten until Mendelssohn discovered his music half a century later. Munkácsy was one of the most prominent painters at the turn of the century in Europe, and in 1940 one of his great canvases of the aging Milton was still prominently displayed in the New York Public Library. Today, you would be hard-pressed to find anybody in New York who knows of Munkácsy. Similarly, we may know the names of a few generals, but who knows the names of the genuine war heroines decorated with the Congressional Medal of Honor?

If you think of it, the spectacular French expedition to the equator contributed little to science as compared to the quiet labors of brother Johann Gregor Mendel in his monastery with his pea plants. The edifice of science is built of small bricks laid down by individual and collective effort. There are many men and women who work in virtual anonymity who do great works, even though the rewards in money and honor are meager. It is innate curiosity that motivates science, and the excitement of finding new truths is almost like magic. This is why so many pursue careers in science and technology, not merely to make a living, but for the pleasure and excitement of their work. These unknown and uncounted are my ultimate heroes. ■

This article is one of a series of Dr. Gabor B. Levy's essays on science and society containing thought-providing editorials previously published in *International Scientific Communications Journals*. The book expresses the author's point of view on such subjects as *Our Society, Our Economy, Ethics, Lawyers and the Law, Health and Medicine, Statistics, Science, Pseudoscience, Metrology, and New Directions*. Size 8½" x 5½". Price only \$10.99 plus \$3.50 for shipping and handling. Order now by check or money order, as supplies are limited. International Scientific Communications, Inc., 30 Controls Drive, Shelton, CT 06484.

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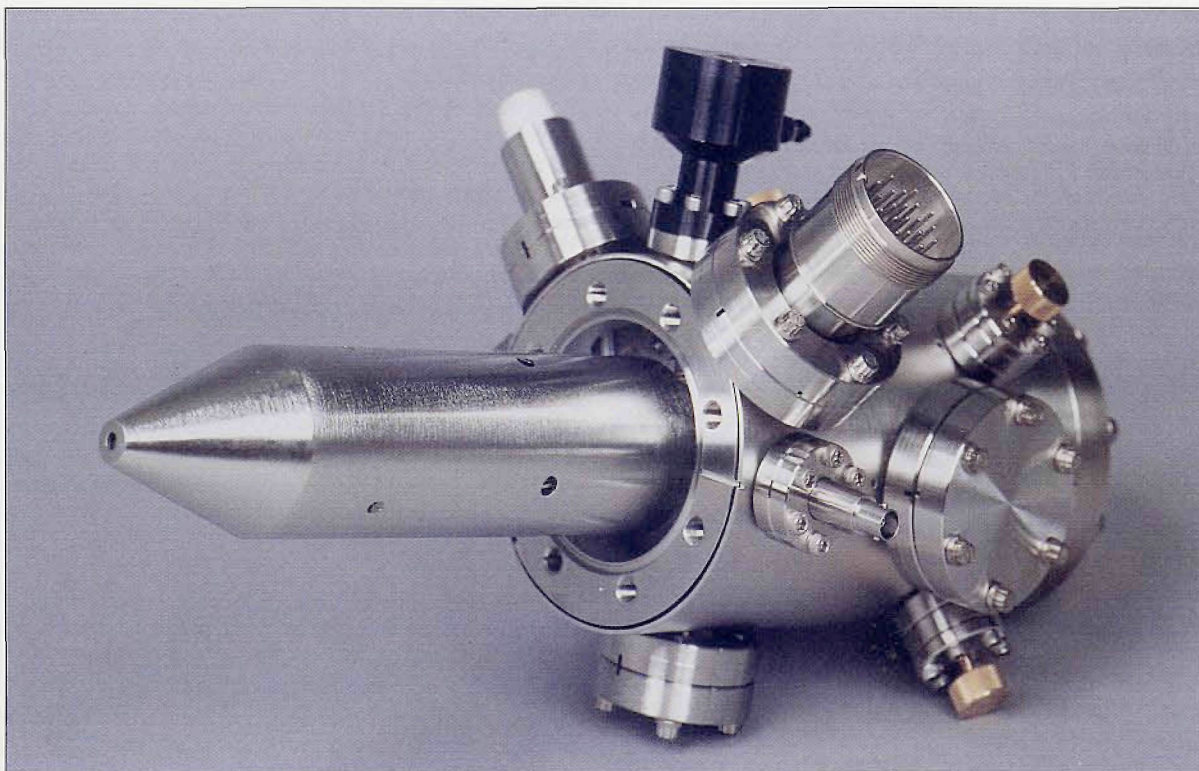
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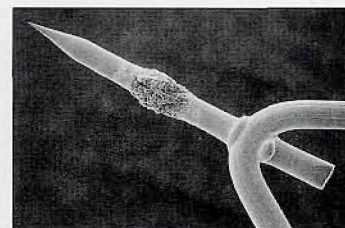
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