Faces and Places

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L.A. Geddes: A Biomedical Engineering Activist

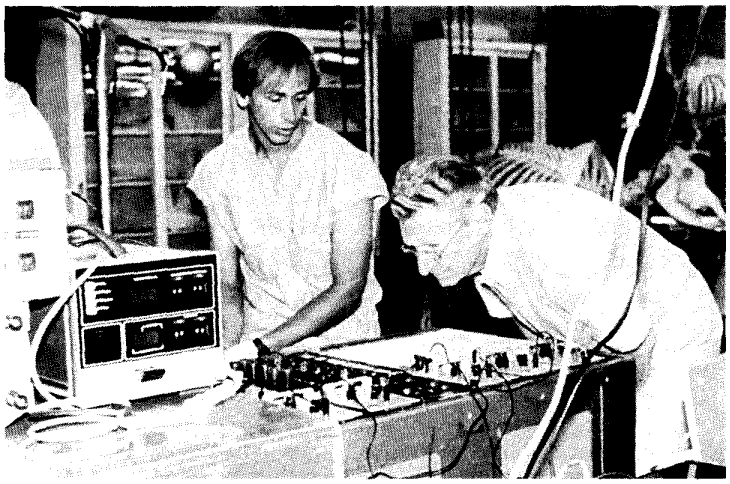
One of the leading lights in biomedical engineering is Leslie A. Geddes. Many of us know him through his seminal book, *Principles of Applied Biomedical Instrumentation,* which he co-authored with L.E. Baker initially in 1968. His career began over 50 years ago when a McGill University professor encouraged him to break family tradition by studying engineering instead of medicine, despite his interest in both fields. Because dual majors were unknown at the time, Geddes chose electrical engineering, earning a bachelor's and master's in electrical engineering from McGill. He pursued his interest in medicine by applying his problem-solving talents to medicine, initially in building physiological amplifiers for the Montreal Neurological Institute at McGill. Some highlights of his tenure at McGill (1945-1952) included the development of the world's first sterilizable electrode and the associated equipment for recording brain waves from the surface of the cortex. He also built advanced electromyography recorders used for diagnosing nerve injuries.

The second phase of Geddes' long career in biomedical engineering was spent at the Baylor Medical College in Houston, Texas, where he developed the Physio-Graph, a modular physiological recording system capable of recording heart sounds, blood pressure, ECG, EEG, and other important physiological signals. The Physio-Graph was an outgrowth of his strong desire to teach the quantitative and technical sides of physiology. His interest in attacking the problems of heart disease led eventually to two key laws of ventricular defibrillation—dose concept and strength-duration relationship. During this period in his life, Geddes also managed to earn a doctorate in physiology in 1959.

Geddes' creativity and accomplishments drew the attention of Purdue University, which courted him enthusiastically for two years. Finally, he and Joseph Bourland, Willis Tacker, and Charles Babbs moved their research to Purdue in 1974, where Geddes established the Hillenbrand Biomedical Engineering Center. Continuing his interest in cardiovascular measurements and intervention, Geddes developed noninvasive or minimally invasive techniques for measuring cardiac output (using salt water) and blood pressures inside the heart. He also developed a method for stimulating the phrenic nerve (for artificial respiration) via body-surface electrodes. He was instrumental in developing the first disposable blood-pressure transducer. Geddes was the Showalter Distinguished Professor of Bioengineering and the director of the Center from 1974 until his retirement in 1991.

The activist nature of Geddes can be readily seen by the following partial list of accomplishments: 22 books printed, 760 journal articles published, and 23 patents awarded. For these and many other innovative contributions, Geddes has been honored by a number of prestigious awards, including election to membership in the National Academy of Engineering and being a fellow of the IEEE, AAAS, American College of Cardiology, Australian College of Physical Medicine, Royal Society of Medicine, and Academy of Forensic Engineering. He also received the AEMB Award for leadership in biomedical engineering, an IEEE/EMBS Career Achievement Award, an Outstanding Educator award from the American Society of Engineering Education, and the 1994 Edison Gold Medal from IEEE.

After his many years in biomedical engineering and numerous accomplishments, Geddes earned the right to a restful retirement. Instead, he remains very active as the Showalter Distinguished Professor Emeritus of bioengineering at Purdue University. Every day, he arrives very early at his university office and returns home in the early afternoon. He finds tremendous excitement and enthusiasm in mentoring graduate students and in solving biomedical problems. Geddes' current research interest stemmed from his focus on the limitations of lung transplants and of using gut tissues as a substitute blood-gas membrane. A series of surrendipitous events led to the discovery that the submuscosa of the small intestines could serve as a fabulous scaffold and promoter of tissue ingrowth. Geddes and his collaborators found that this tissue (made of almost pure collagen) became the host tissue with no rejection observed. This discovery has resulted in several patents and strong interest from venture capitalists.



L.A. Geddes (right) hard at work in his lab in 1996.

When asked how he would describe himself, Geddes replied that biomedical engineers and scientists could be roughly classified into two groups—those who intensively work with mounds of data and those who prefer to focus doing something to ameliorate problems or deficits (an activist). He viewed himself as being firmly in the latter group. When asked where he thought the field of biomedical engineering was heading, Geddes opined that

there will always be three main areas in medicine—diagnosis, therapy, and rehabilitation—and that biomedical engineering would reflect these three spheres of activity. For the near future, the "hot" areas in biomedical engineering, particularly in the United States, will be tissue engineering, cardiovascular physiology, and dynamic cardiomyoplasty.

Geddes lives with his wife of 38 years, La Nelle. He has one son, who Geddes describes as a "born salesman." His son's successes in the frozen food and lumber businesses allowed him to retire in Canada at the ripe old age of 51 years. His passion for teaching led him to start a new course on "Medical Device Accidents" and to give lectures in two other courses. His current hobby is reading about and contributing to the history of science.

President's Message

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the IEEE Strategic Plan completed in 1998 was aimed at strengthening the culture and the image of the IEEE in the face of this change. The corresponding action item took the form a "branding" study. Predictably, the study acknowledged the tremendous intellectual and professional capital enjoyed by IEEE worldwide. But it also echoed the main points made in the studies that preceded the 1963 merger by stressing that the needs of the membership had evolved and expanded beyond the Institute's traditional forms of member service and support. It also warned that the Institute appears in danger of becoming irrelevant to certain critical constituencies, including industrial leaders and the future generation of students and recent graduates. It is clear that swift action will be needed to position IEEE favorably to meet the challenges of the next century and to facilitate its progress toward a modern, responsive, adaptive and inclusive, hence an exemplary, engineering institute. To address the report, and, in particular, its recommendations, the IEEE Board of Directors charged the IEEE President to establish two corporate-level ad-hoc committees, one of which is the Corporate Branding committee. Indeed, as a Society, we are keenly interested in playing a part in this evolution. I have volunteered to serve at both the Technical Activities Board level and the Corporate-level branding committees, and I will report to you on the proceedings.

While proudly rooted in our history and determined to affect positive change within the IEEE, we are committed to remain abreast of the biomedical engineering frontier and eager to play a leading role in the growth and development of the biomedical engineering enterprise. We thus recognize the urgency and the critical importance of strategic planning at the Society level. The Strategic Planning ad-hoc committee formed under the leadership of Susan Blanchard (President'96), and currently spearheaded by Kris Ropella has been tasked to help steer our Society in the right direction. The committee, expanded by invitation of additional members and re-energized by the strong support of our President-Elect Andy Szeto, will hold a meeting prior to the Spring AdCom followed by a brainstorming session open to all AdCom members. We also hope to rearrange the AdCom meeting agenda to give special emphasis to the Strategic Planning deliberations. We are therefore looking forward to a lively and provocative debate that will engender forward-thinking strategies and an effective implementation plan based on creative and productive solutions.

I plan to write my next column following our next AdCom meeting. I promise to keep you posted on our strategic thinking and action plan and on progress in our other key initiatives. Indeed, I do value your input in the meantime.

With warm regards,
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CALL FOR NOMINATIONS

FOR THE POSITION OF STUDENT REPRESENTATIVE TO THE ADMINISTRATIVE COMMITTEE (ADCOM) OF THE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY

Nominations are requested for the position of Student Representative to the IEEE EMBS Administrative Committee (AdCom) for the term beginning January 1, 2000 (two-year term).

"For the purposes of election to the AdCom, a student shall be defined as an EMBS member who is registered in a college or university either as a full-time undergraduate or as at least a one-half time graduate student and is pursuing a degree in biomedical engineering or a related field. The student may be either an IEEE member or an IEEE Student member."

If you are interest in this position, or would like to nominate someone to this position, please contact Dr. Robert Kearney, Chair, EMBS Nominating Committee, McGill University, Biomedical Engineering Department, 3775 University Street, Montreal, QC, H3A 2B4, Canada, T: (514) 398-6737; F:(514) 398-7461; Email: rob@cortex.biomed.mcgill.ca before May 1, 1999.