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# Richard Borgens, 1946–2019

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It is an honor and privilege to celebrate the life of Richard Borgens whom the biology field in general and the bioelectricity field in particular lost in 2019. During his lengthy and remarkable career, Richard made numerous contributions to the study of endogenous bioelectric fields and their roles in development and regeneration. He was a prolific and tireless worker, producing a steady stream of important articles across the 1970s and subsequent six decades. He published some of the best functional data showing that endogenous transepithelial electrical gradients were important for limb development and regeneration. Going further, he characterized the role of bioelectrics as instructive influences in repair and as a coordinate system in brain development. An important aspect of Richard's work is that he always paired his rigorous basic science with a strong effort to translate it to biomedicine. He was especially interested in neural regeneration, such as spinal cord repair, and treated numerous dogs with spinal cord repair strategies in his veterinary applications. On a personal level, Richard Borgens was one of the reasons we got into bioelectricity.

**Richard Borgens, PhD,** left, and **Michael Levin, PhD,** right, at the Levin Lab at the Forsyth Institute, Boston, circa 2002.

*Michael Levin*. I discovered his inspiring work as a high-school student. His clear writing, remarkable results, daring hypotheses, and artistic figures made the field irresistible to many. One of my all-time favorite science moments was that when I was able to invite him to visit my new laboratory at Forsyth Institute in 2001 (see photo). Meeting him in person was everything I had hoped for. He was not only brilliant and insightful, but also gracious, funny, supportive, and encouraging to me and my postdocs. He even sent us a whole box of electrical stimulation equipment, to assist our fledgling efforts. He was a colorful and complex man, and a great scientist. We are still citing his articles in our latest study, and expect to do so for a long time to come. He will be greatly missed.

*Ann Rajnicek*. Richard was inspirational in my formative years as a PhD student at Purdue University. He constantly challenged me, whether it was hitting a softball straight toward my position in short center field or by asking those difficult questions as a member of my PhD examining committee. Although I still cannot catch a high fly ball, he helped to shape my idea of what scientific enquiry should be; that it should question dogma as a route to innovation and that it should be incredibly, incredibly exciting. I channel his bubbly enthusiasm whenever I do public outreach of science events or when I discuss his studies on spinal cord injury in my undergraduate teaching. His influence continues in ways he could not have imagined.

Here is what Purdue University, where Richard Borgens served as a senior member of the faculty for 21 years, said about him (reproduced with permission):

> The Purdue University College of Veterinary Medicine received sad news last week about Dr. Richard Borgens, a retired faculty member and true pioneer in the field of paralysis research, who passed away November 25. He was 73.
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> A graduate of North Texas State University, Dr. Borgens earned his PhD in developmental biology at Purdue University in 1977. After serving as a post-doctoral fellow at Yale University and working at the Institute for Medical research in California and the Jackson Laboratory in Maine, Dr. Borgens returned to Purdue as a faculty member in the College of Veterinary Medicine and established the Center for Paralysis Research. In addition to serving as the center director, Dr. Borgens held a joint appointment as the Mari Hulman George Professor of Applied Neuroscience in the Department of Basic Medical Sciences and professor of biomedical engineering. He also served as a founding board member and chief scientific officer for Andara Life Sciences, Inc.
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> Regarded as a preeminent researcher in spinal cord neuronal regeneration, Dr. Borgens also was instrumental in the development of Ampyra, a pharmaceutical aid for multiple sclerosis patients. Purdue researchers developed the original concept and basic science, and conducted initial animal studies at Purdue's Center for Paralysis Research facilities. The first clinical testing of the drug in paraplegic canines occurred on the Purdue campus in the College of Veterinary Medicine. ''Dr. Borgens had a true passion and energy for the work he did in pursuit of new treatments for paralysis and neurodegenerative diseases,'' said Purdue Veterinary Medicine Dean Willie Reed. In 2006, the Indiana Health Industry Forum (IHIF) presented Dr. Borgens with the Outstanding Contribution to Scientific Commercialization Award.
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> Beyond his role as a Purdue faculty member, Dr. Borgens was known for his love of music. Originally trained on classical guitar, he played in many bands. Additionally, he loved history and enjoyed collecting and restoring automobiles and antique firearms. A tribute for Dr. Borgens was held at Lafayette's Columbian Park on Wednesday, December 4.

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