Crossing Biological Kingdoms: Development of Spinach Leaves as Scaffolds for Tissue Engineering

ABSTRACT One of the major hurdles in growing replacement human tissue is the inability to deliver oxygen, nutrients, and essential molecules required for cells to survive. To overcome this limitation, we propose an unconventional approach that involves crossing the plant and animal biological kingdoms. By stripping away the plant cells using a technique developed for mammalian organs and tissues, a cellulose structure with an inherent network of vessels to distribute blood flow is left behind. This scaffold supports cell attachment, including contracting human muscle cells. The crossing of biological kingdoms may allow for new biomaterials with multiple applications in tissue engineering.

BIOGRAPHY Glenn R. Gaudette, PhD, is the William Smith Dean’s Professor of Biomedical Engineering and the Director of the Value Creation Initiative at Worcester Polytechnic Institute. He received his PhD in Biomedical Engineering from SUNY – Stony Brook. He has over 75 peer-reviewed publications, co-edited a book on Cardiovascular Regeneration, has 4 issued patents and founded a company based on the technology developed in his laboratory. His research, which is supported by the National Institutes of Health and the National Science Foundation, aims to develop a treatment for the millions of Americans suffering from myocardial infarction and other cardiovascular diseases. He has pioneered the use of plants as scaffold for heart regeneration and lab-grown meat. His work has been featured throughout the world including Bill Nye Saves the World, CBS’s Innovation Nation, the BBC, Popular Science, The Washington Post and Fox National News. His work was named one of the top medical breakthroughs of the year by Boston Magazine and was the 7th Most Popular Stories of 2017 in National Geographic. Dr. Gaudette also teaches biomedical engineering design and innovation, biomechanics and physiology. He promotes the development of the entrepreneurial mindset in his students through support provided by the Kern Family Foundation and was named the 2015 Faculty Member of the Year by the Kern Entrepreneurial Engineering Network. Dr. Gaudette also participates in multiple faculty governance committees at WPI and enjoys working with WPI students in the classroom, on projects and in the research laboratory.