# Plant Scientist Using Cross-Disciplinary Technologies to Find Treatments for Human Diseases

BIO5 Institute
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Since arriving at the UA in 1989 with interests in computers, biochemistry and plant sciences, David Galbraith has interwoven plant science research with technology to tackle major biological questions involving cell nuclei.

Nuclei contain specific genetic material, or "operating instructions," that regulate everything from how plants respond to environmental stresses and how to increase the yield of food crops to how to treat diseases where the action of cells go awry, as happens with cancer.

"I've worked particularly with a technology called flow cytometry and cell sorting, and am proud to be one of the pioneers in developing and using this technology with plants," says Galbraith.

"A plant scientist doing pancreatic cancer research â€“ wow," Fernando Martinez, director of the UA's **BIO5 Institute** [1], says when describing the work of Galbraith, a BIO5 member and professor of plant sciences.

"Davidâ€™s work has the potential to enhance our understanding of how cells of all types work â€“ or, in the case of many human diseases, of how they fail to work."

Galbraith knows that plants are more than just simple organisms in nature. He believes what we learn about plants is key to advancing the pace of scientific discovery in a variety of disciplines, and that by using similar cell-sorting techniques, we can come to a fuller understanding of diseases that affect organs. Galbraith is hopeful that there is even a niche for his work in President Barack Obama's newly announced **BRAIN Initiative** [2].

He currently is working on a National Institutes of Health-funded project with Thomas Doetschman, UA professor of â€ªcellular and molecular medicine. The project is an opportunity to execute in-depth research into pancreatic cancer cells using the same kind of revolutionary cell-sorting technique to isolate nuclei from genes and then sequence them to monitor their activity.

With help from Doetschman, Galbraith hopes to use this information to help locate the cancer earlier and more effectively. The benefits of this research could greatly improve survival rates.

"Today, 5 to 10 percent of patients with pancreatic cancer will not survive longer than five years because it generally avoids early detection in patients," says Galbraith. "By the time the cancer is found, the window for treatment has closed considerably."

He says he believes novel biological technologies will provide a uniquely detailed understanding of how human organs function, based on discovering the molecular functions of all the different cells that make up those organs.

"The hope would be that this would accelerate progress in the search for therapies to alleviate and cure human disease," he says.

As a scientist committed to applying what he knows and learns to an array of scientific challenges, Galbraith found an inevitable attraction to the collaborative atmosphere at the BIO5 Institute.

"This is an interdisciplinary kind of technology, and I believe strongly in outreach and collaboration," he explains. "The BIO5 Institute is an ideal place to develop this because it now can be applied not only to plants, but also to animals and to biomedical solutions."

In addition to being a world-class researcher, Galbraith is an avid member of the Tucson Symphony Chorus. The group, which is run by Bruce Chamberlain, director of choral activities at the UA **School of Music** [3], rehearses every Monday during the semester. Additionally, Galbraith performs with a smaller group called Awen Rising. He also serves on the board for the Tucson Chamber Artists.

"Musical training is good training for work and life because of the amount of focus that it requires and the level of excellence that you strive for," says Galbraith. "Science and music are very important to me, and I am lucky enough to have fun doing both."

Teaching also is important to Galbraith, as he instructs both undergraduate and graduate students. From introductory plant sciences to biochemistry and genomic methods, he stresses the significance of plants and technology in relation to solving some of science's most pertinent concerns.

"When we address how we will feed 9 billion people in the year 2050," he says, "or how we can use plant research to

tackle human disease, the students become invested in the scope of what they can learn and accomplish."

*Students Brittany Reynoso and Cameron Chery contributed to this article.*

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**Links**
[1] http://www.bio5.org/ [2] http://www.whitehouse.gov/infographics/brain-initiative [3] http://music.arizona.edu/