

2007

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### Recommended Citation

Kishinevsky, Felix (2007) "Dr. Larry DeLucas: The First Optometrist in Space," *Inquiro, the UAB undergraduate science research journal*: Vol. 2007: No. 1, Article 18.

Available at: <https://digitalcommons.library.uab.edu/inquiro/vol2007/iss1/18>

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# Dr. Larry DeLucas: The First Optometrist in Space

## BIOCHEMISTRY

### Felix Kishinevsky

To many he will always be associated with the 331 hours he logged aboard the 1992 space shuttle mission STS-50. However, Larry DeLucas, O.D., Ph.D., serves many important roles at UAB: Professor in the Department of Optometry, Director of the Comprehensive Cancer Center X-ray Core Facility, Senior Scientist at the Comprehensive Cancer Center, and Director of the Center for Biophysical Sciences and Engineering.

It may seem strange that an optometrist would be selected as an astronaut and conduct experiments in space. Nevertheless, while DeLucas's career has taken him through many seemingly disconnected fields, his passion for chemistry is a major unifying factor.

DeLucas's interest in chemistry has been evident since high school, where he excelled in college level chemistry classes. During his junior and senior years at UAB, DeLucas worked in the chemistry department to see if a career in research was right for him. After graduating with a B.S. in chemistry and still unsure about pursuing a career in research, DeLucas went back to school and obtained a Masters degree in chemistry. While studying for his Master's degree, DeLucas developed an interest in crystallography and made it the topic of his Master's dissertation, in which he specifically discussed the calcification of bones and teeth.

After obtaining his Master's, DeLucas continued to pursue his interest in crystallography and worked as a research associate in the crystallography laboratory at UAB's Institute of Dental Research. At that time, crystallography was a relatively small field, and DeLucas was unsure if he would be able to obtain a staff position in that department, and thus decided to pursue a Ph.D. in biochemistry.

Through the Dean of Student Affairs for the School of Optometry, DeLucas was informed that the optometry school was looking for students who wanted to do research on the structure of molecules related to vision. Planning to have



**Dr. Larry DeLucas**

optometry as an alternative profession if a position in crystallography did not present itself, he embarked on a five-year pursuit of a joint degree. During the day, DeLucas attended optometry school classes. At night, he worked on his doctorate research, plus he took a full load of optics classes during the summers. After five years of rigorous study, DeLucas obtained his doctorates in biochemistry, optometry, and a Bachelor of Science degree in physiological optics.

By then, DeLucas was teaching classes at the optometry school and working in a clinical capacity. As a way of joining his research and optometry interests, DeLucas obtained several grants that would allow him to attempt to crystallize proteins

that were involved in eye disorders and also associated with diabetes. Around this time, DeLucas began meeting with various NASA scientists from the Marshall Space Flight Center and discussing the possibility of growing crystals in space.

The ultimate goal of crystallography is structure-based drug design. Crystallography research enables scientists to determine the exact molecular structure and position of atoms in a molecule. Processing this information through a computer can give researchers a three-dimensional image of the structure. Such knowledge of how proteins work allows scientists to design drugs that are more effective at treating various diseases. In space, these crystals grow much larger and more slowly.

*DeLucas advises those considering a career in research to have a clinical background that can help in directing their research of choice.*

After designing a new and effective way to grow crystals in space, NASA flew DeLucas' equipment and experiments aboard a total of four space shuttles over nine months. After each flight, DeLucas redesigned his equipment to make it more effective. However, after the Challenger disaster, NASA developed a much more stringent set of rules for any equipment brought aboard a shuttle and required DeLucas to contract an outside company to build his equipment. DeLucas subsequently decided to hire five engineers to design his equipment. At this point DeLucas' career took a turn from merely crystallizing proteins to developing technology that would crystallize proteins more quickly and accurately, yet he did not discontinue his crystallography research.

One of DeLucas most famous achievements was serving as the payload specialist on the 1992 U.S. Microgravity Laboratory (Space Shuttle Mission STS-50) under Commander Dick Richards. Over a period of nearly two weeks, DeLucas traveled

over 5.7 million miles in 221 orbits and conducted several hundred experiments related to crystallography and various other fields.

DeLucas's main role today is serving as the Director of the Center for Biophysical Sciences and Engineering. DeLucas is combining all of his interests into the ultimate goal of designing medications that better target and treat the diseases that seem to evade current treatment methods. A more substantial project involves attempting to crystallize, in large quantities, the cystic fibrosis transmembrane protein. Employing a total of 105 people, including 27 engineers, 11 faculty members, 4 technicians, and the CBSE truly is an interdisciplinary building.

DeLucas views interdisciplinary teamwork as being vital to the future of scientific research. The days of a single scientist working by himself and being an expert in various fields of study are becoming rare, and cooperation among scientists representing various fields of study is increasing. This is

evident at the CBSE, where biochemists, crystallographers, and molecular geneticists work together.

Speculating on the future of scientific research, DeLucas believes that right now is the best time for scientific research. Advances in technology and the potential force of nanotechnology have made scientific research a very exciting place at the present. However, research opportunities sometimes decrease, and funding for scientific research is not at its current peak due to various factors. DeLucas advises those considering a career in research to have a clinical background that can help in directing their research of choice. For DeLucas, a clinical background in optometry helped him in his research of the structure of proteins related to ocular diseases.

DeLucas is eager to share his love of science with high school students and undergraduates. He has high school students working in his lab every summer, and college undergraduates work with him throughout the school year.