SD EPSCoR
RESEARCH. EDUCATION. ECONOMIC DEVELOPMENT.
APRIL 2017 E-NEWSLETTER

South Dakota Science Fair Recap

The 2017 South Dakota Regional Science Fairs saw more than 1,600 student participants in grades 6-12 representing 66 schools across South Dakota. Approximately 300 volunteer judges and 95 teachers also participated, ensuring the success of the statewide fairs.

SD EPSCoR in partnership with Fisher Science Education, sponsored the High School Science Lab Makeover Award Competition in which one rural school from each regional science fair was selected to receive $5,000 from SD EPSCoR and an additional $500 from Fisher Science Education to be used towards the purchase of science, technology, engineering and math (STEM) research supplies and classroom equipment.
The 2017 award winners included:

- **Elk Point - Jefferson High School -** ***Eastern South Dakota Science and Engineering Fair***
- **Andes Central High School -** ***South Central South Dakota Science and Engineering Fair***
- **Sisseton High School -** ***Northern South Dakota Science and Mathematics Fair***
- **Hill City High School -** ***High Plains Science and Engineering Fair***

In addition to the High School Science Lab Makeover Award, SD EPSCoR and Fisher Science also hosted the School Challenge Competition in which schools whose top three scoring student research projects have the highest mean scores receive award money toward the purchase of STEM classroom equipment and supplies. Awards were distributed to the top three schools at each regional fair (1st place - $1,100, 2nd place - $800, 3rd place - $525).

Observer awards were also given to select students that showed promise as a future competitor for the Intel International Science and Engineering Fair (ISEF). SD EPSCoR will sponsor one student from each of the regional fairs to attend the 2017 Intel ISEF on an all-expense-paid trip as an observer.

2017 also marked the establishment of the first pre-regional science fair which took place in Martin, South Dakota. The pre-regional fair allowed students in southwestern counties of South Dakota to compete prior to a regional fair. Approximately 58 students participated from Bennett County School District. SD EPSCoR also awarded one student project for their exemplary research and their teacher the Intel ISEF observer award.

In total, more than $29,000 was distributed across each of the fairs by SD EPSCoR. SD EPSCoR believes that science fair research projects are a capstone learning activity that helps students understand and apply the scientific method and serve as the basis for exploring science, technology, engineering and math (STEM) careers. Our infrastructure investments that are being implemented will contribute to expand hands-on, inquiry-based problem solving research experiences for students that provide them with the opportunity to apply what they've learned.

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2017 Science Fair Photos

FACULTY SPOTLIGHT -- Sev Van slambrouck, SDSU

All diseases result from disturbances in normal cellular processes. To help the diagnosis and treatment of diseases, we must understand the cause and the changes that happen at the cellular level.

The elucidation of the human genome increased the potential of identifying genes responsible for cell behavior. However, studying changes in expression patterns of genes and their gene products is not sufficient for understanding normal cellular processes or the alterations causing diseases. The functions of the gene products, (proteins) and their cellular context must also be recognized.

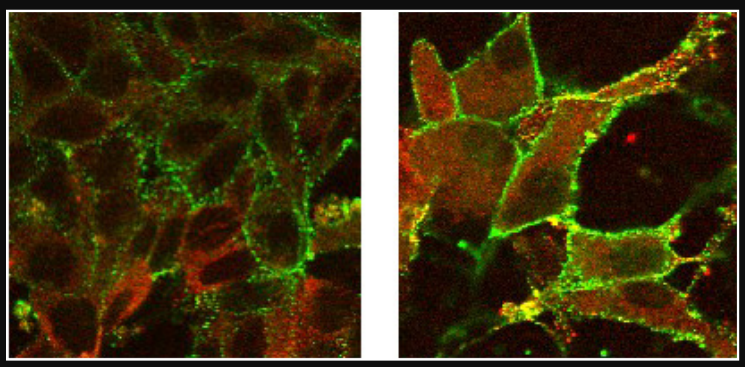
Dr. Sev Van slambrouck is an Assistant Professor at South Dakota State University. Her observations have resulted in a pioneering idea for the regulation of cellular processes that defines a living cell. Her research has demonstrated that the location of proteins in a cell, as well as the location of lipids and carbohydrates, determine the way a cell behaves and functions.

Another important aspect of her research is understanding how proteins, lipids and carbohydrates interact with each other to control a cell's contact with other cells.

This novel concept of spatiotemporal regulation controlling the behavior of cells received an award for outstanding achievement at the 21st World Congress on Advances in Oncology and at the 19th International Symposium on Molecular Medicine held in Greece in October, 2016.

Dr. Van slambrouck gained her functional glycobiology knowledge through a technology transfer fellowship award from the International Union for Cancer Control (UICC) and spent several months visiting the Unité de Glycobiologie Structurale et Fonctionnelle of the Université des Sciences et Technologies de Lille, in France. She also attended a workshop on structural glycobiology at the Complex Carbohydrate Research Center (CCRC) at the University of Georgia in Athens (UGA). In upcoming years, she will expand her research field with mathematical modeling and quantitative simulations to further unravel the spatial characteristics and complexity of interactions. For this direction, she was awarded and attended a NSF-sponsored workshop in mathematical modeling held at NIMBioS at the University of Tennessee (Knoxville).

Dr. Van slambrouck's research has been supported by competitive grants including those from the National Institute of Health, the International Union for Cancer Control, the New Mexico Department of Veteran Services, the South Dakota Competitive Research Grant Program and the Florida Blue Foundation.



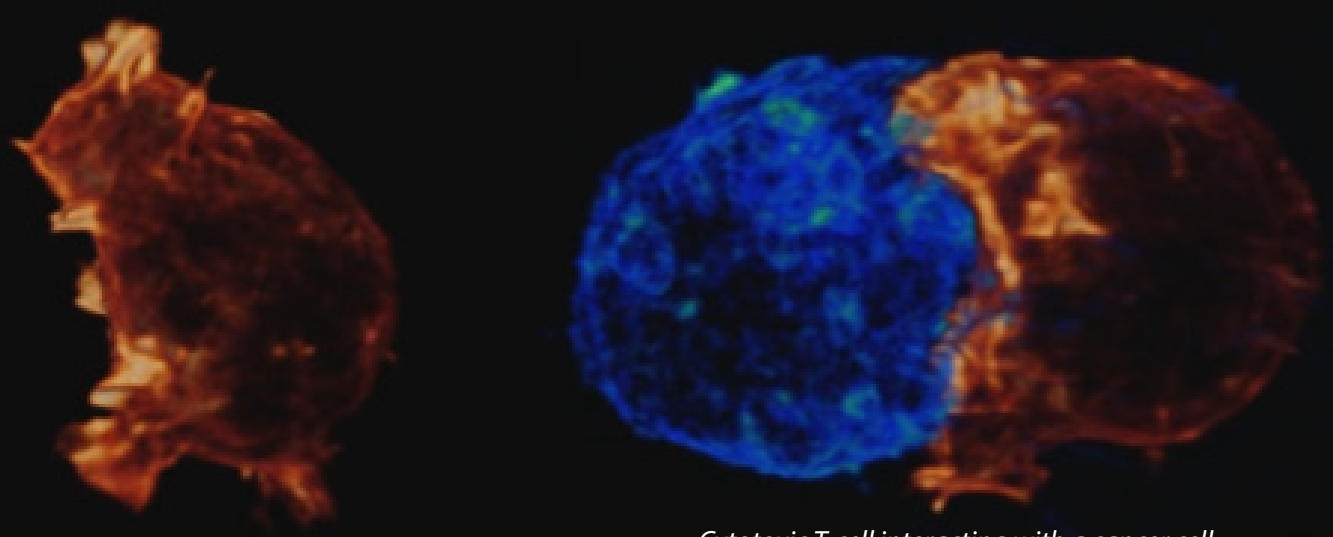
Colocalization (yellow) of a protein (green) and lipid (red) in the cell membrane stimulates interaction of these cells with surrounding tissue (right panel)

FACULTY SPOTLIGHT -- Dr. Robert Anderson, SDSM&T

South Dakota School of Mines & Technology (SDSM&T) Assistant Professor Dr. Robert Anderson's research uses lattice light-sheet microscopy (LLSM) to visualize in 3-D how cellular processes proceed through time. With this new technique, high-speed imagery will provide much of the information needed to improve our understanding of how cells actually work internally and respond to signals from their environment. This understanding will have applications toward all areas of human and animal cellular biology.

Since the pioneering work with green fluorescent protein (GFP) in the 1990s, bio-technology developments enabling precise manipulation and insertion of fluorescent fusion proteins in biological systems have placed fluorescence microscopy at the forefront in the study of living systems.
A complete description of biology requires dynamical imaging of three-dimensional (3-D) processes, e.g., the inner workings of the cell.
The primary focus of research in Dr. Anderson's laboratory at SDSM&T is the use of LLSM and computational processing of the resulting imagery in support of biological research within the state of South Dakota. Dr. Anderson is a faculty member of the SD BioSystems Networks & Translational Research (BioSNTR) initiative which focuses on systems biology and translational research to advance biotechnology within South Dakota.

The LLSM instrument can be operated in a variety of modalities to effect dynamic 3-D imaging of fluorescence at biologically relevant time scales with resolution exceeding the diffraction limit. The LLSM represents the state-of-the-art in high-efficiency, high-speed, low photo-toxicity fluorescence imaging technology. The instrument designed by Nobel laureate Eric Betzig has been made available to Dr. Anderson's lab at the South Dakota School of Mines and Technology (SDSM&T) through a license agreement with the Howard Hughes Medical Institute (HHMI). Dr. Anderson has very recently completed construction of the LLSM at SDSM&T, one of only a few available in the United States.



Cytotoxic T-cell interacting with a cancer cell.

SD EPSCOR IN THE NEWS

- State Capitol Hosts Researchers March 2
- State's science and tech industries increase economic growth
- It isn't rocket science. Well actually, yes it is.
- 63rd Annual ESD Science and Engineering Fair showcases young talent
- STEM Governor's Proclamation
- Andes Central wins $5,000 at SCSDSEF
- Scoring Big with SD EPSCoR
- 191 Students Compete at SCSDSEF

UPCOMING EVENTS

- **REACH Committee Meeting** - May 22, 2017
  Cedar Shore Resort - Oacoma, South Dakota
- **All Investigator's Meeting** - May 23-24, 2017
  Cedar Shore Resort - Oacoma, South Dakota
- **Intel International Science and Engineering Fair** - May 14-19, 2017
  Los Angeles, California
- **Graduate Women in Science National Conference** - June 15-17, 2017
  Sioux Falls, South Dakota

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