CC* Network Design and Implementation for Small Institutions: The Western South Dakota Research and Education Network

- BHSU - 4,200 Students
- SDSMT - 2,800 Students
- USD (partner)
  - 10,000 Students
  - 2014, 2016 CC* grants
- Science DMZ and supporting campus infrastructure

Anderson, Keeter (BHSU)
Benjamin, Hinker (SDSMT)
Jennewein (USD)

Black Hills State University

WestCore
western south dakota dna core facility

Dr. Cynthia Anderson: WestCore DNA Sequencing and Genotyping Core Facility

- Collaborators throughout the state and region
- Transcriptome sequencing, including library preparation, as well as next generation sequencing
- Discovered through NIH IDeA INBRE program
- Local storage, then cloud, and now distributed storage and computing

152 Proceedings of the South Dakota Academy of Science, Vol. 95 (2016)

MICROBIAL COMMUNITY STRUCTURE OF "CAVE SILVER" BIOFILMS FROM THE SANFORD UNDERGROUND RESEARCH FACILITY IN LEAD, SOUTH DAKOTA, AS DETERMINED BY16S RDNA SEQUENCING

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ABSTRACT

"Cave Silver" biofilms, nicknamed for their silvery-iridescent app
documented in cave and mining systems worldwide. Despite their
silver" biofilms are a complex microbial community. European studi
high proportions of Actinobacteria, Proteobacteria, and unclassifie
ing Sanger sequencing methods. Samples collected from Sanford U
Research Facility (Lead, South Dakota) were analyzed using Next Ge
quencing of 16S rDNA to compare their microbial community comp
those of European samples. Averages of all SURF samples show high
of Proteobacteria, Actinobacteria, Firmicutes, Chloroflexi, and unclas
Top class matches of Proteobacteria are Alphaproteobacteria, Ga
bacteria, and Deltaproteobacteria. The most abundant class of Actir
Actinomycetes. The high number of unclassified taxa indicate that
contains many uncultured and unknown microorganisms. Comparis
and European biofilms will reveal details of the similarities and differe
"cave silver" communities.

frontiers in Microbiology

ORIGINAL RESEARCH
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Characterization of *Batrachochytrium dendrobatidis* Inhibiting Bacteria from Amphibian Populations in Costa Rica

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Global amphibian declines and extinction events are occurring at an unprecedented rate. While several factors are responsible for declines and extinction, the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*) has been cited as a major constituent in these events. While the effects of this chytrid fungus have been shown to cause broad scale population declines and extinctions, certain individuals and relict populations have shown resistance. This resistance has been attributed in part to the cutaneous bacterial microbiome. Here, we present the first study characterizing anti-*Bd* bacterial isolates from amphibian populations in Costa Rica, including the characterization of two strains of *Serratia marcescens* presenting strong anti-*Bd* activity. Transcriptome sequencing was utilized for delineation of shifts in gene expression of the two previously uncharacterized strains of *S. marcescens* grown in three different treatments comprising *Bd*, heat-killed

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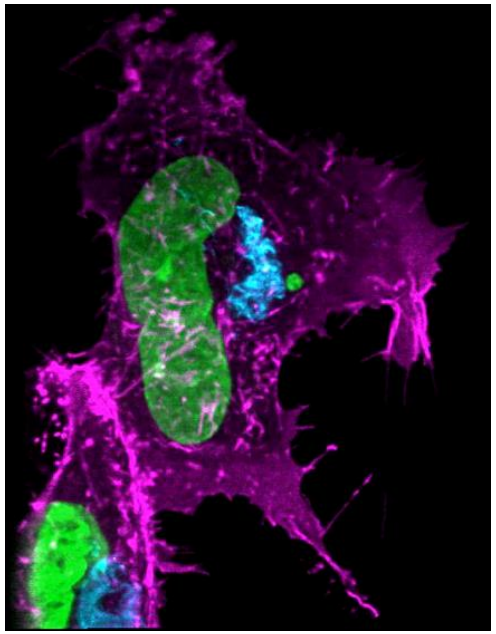
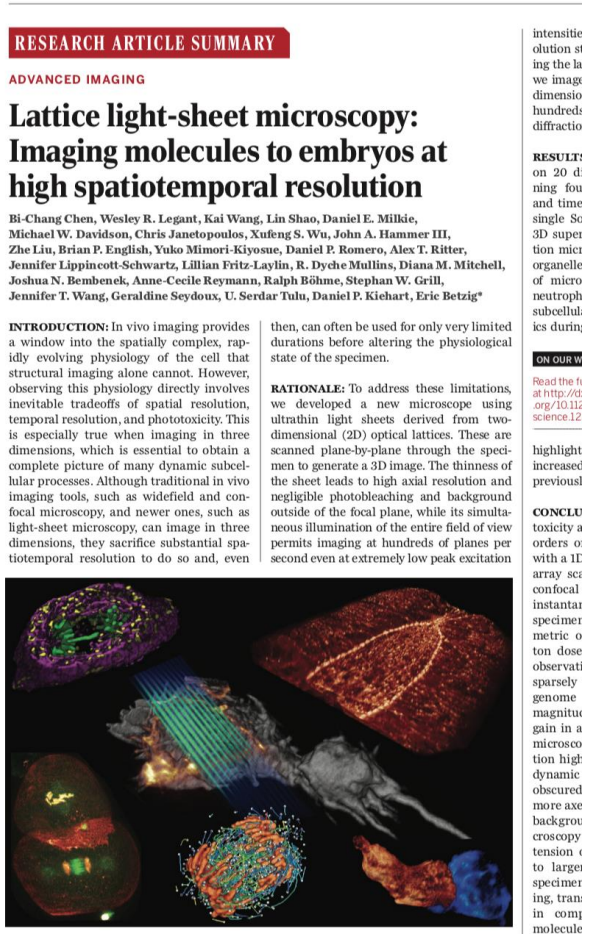
South Dakota School of Mines

Dr. Robert Anderson: Lattice Light-sheet Microscopy

- Lattice light-sheet microscope invented (published) in late 2014 at HHMI
- Generates data at 1.6GB/second
- Fully functional LLSM built at SDSMT through agreement with HHMI
- Very high spatio-temporal resolution
- In Vivo imaging of individual cells





RESEARCH ARTICLE SUMMARY

ADVANCED IMAGING

Lattice light-sheet microscopy: Imaging molecules to embryos at high spatiotemporal resolution

Bi-Chang Chen, Wesley R. Legant, Kai Wang, Lin Shao, Daniel E. Milkie, Michael W. Davidson, Chris Janetopoulos, Xufeng S. Wu, John A. Hammer III, Zhe Liu, Brian P. English, Yuko Mimori-Kiyosue, Daniel P. Romero, Alex T. Ritter, Jennifer Lippincott-Schwartz, Lillian Fritz-Laylin, R. Dyche Mullins, Diana M. Mitchell, Joshua N. Bembenek, Anne-Cecile Reymann, Ralph Böhme, Stephan W. Grill, Jennifer T. Wang, Geraldine Seydoux, U. Serdar Tulu, Daniel P. Kiehart, Eric Betzig*

INTRODUCTION: In vivo imaging provides a window into the spatially complex, rapidly evolving physiology of the cell that structural imaging alone cannot. However, observing this physiology directly involves inevitable tradeoffs of spatial resolution, temporal resolution, and phototoxicity. This is especially true when imaging in three dimensions, which is essential to obtain a complete picture of many dynamic subcellular processes. Although traditional in vivo imaging tools, such as widefield and confocal microscopy, and newer ones, such as light-sheet microscopy, can image in three dimensions, they sacrifice substantial spatiotemporal resolution to do so and, even then, can often be used for only very limited durations before altering the physiological state of the specimen.

RATIONALE: To address these limitations, we developed a new microscope using ultrathin light sheets derived from two-dimensional (2D) optical lattices. These are scanned plane-by-plane through the specimen to generate a 3D image. The thinness of the sheet leads to high axial resolution and negligible photobleaching and background outside of the focal plane, while its simultaneous illumination of the entire field of view permits imaging at hundreds of planes per second even at extremely low peak excitation

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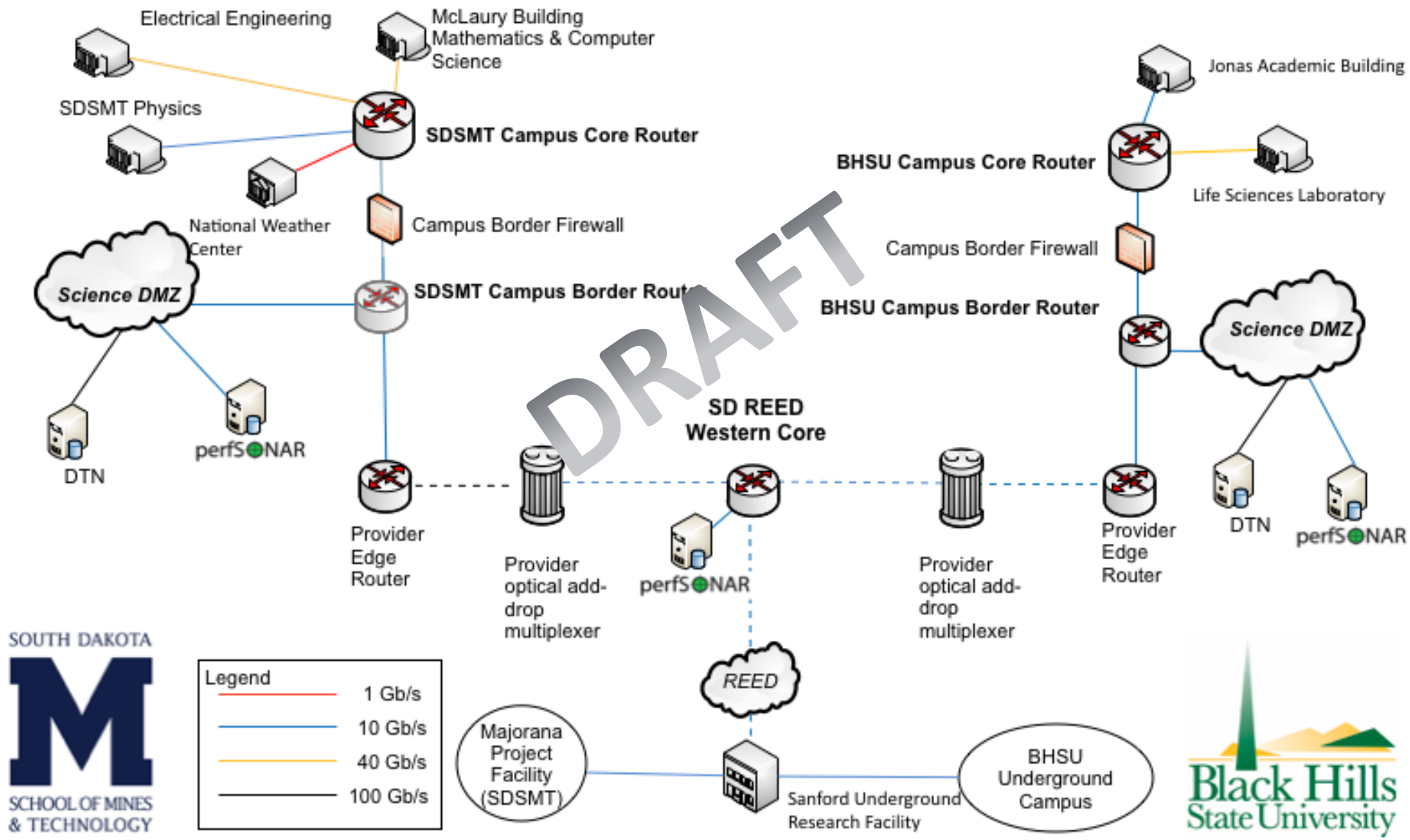
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Mathematics & Computer
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SDSMT Campus Core Router
National Weather
Center
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