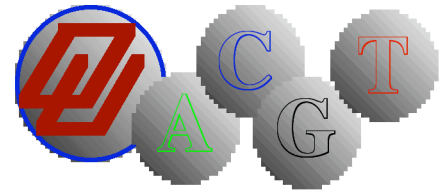




Advanced Center for Genome Technology ACGT 2008 Annual Profile



Overview of Organization

Since its inception as a National Institutes of Health Genome Center in 1990, and an OU approved center shortly thereafter, the ACGT has been at the fore-front of DNA high throughput sequencing. The ACGT also is

- one of the first centers incorporated into the Human Genome Project, and was responsible for the sequencing of Human Chromosome 22 and has attracted more than \$60 million in research grants, mainly from the National Institutes of Health and the National Science Foundation
- home to the Bioinformatics Core Facility (BCF) that houses the E. coli Community's Gene Expression Database (GenExpDB) and funded by the NIH National Institutes of General Medical Sciences
- actively involved in developing large scale DNA sequencing methods and implementing them in collaborations with individual laboratories both from within and outside Oklahoma.
- involved in other world-wide, collaborative, high-profile sequencing projects, including the mouse genome, and in decoding the genes for various bacteria, fungi, and plants
- partnered with several different departments at the University of Oklahoma, other educational institutions within the state, and universities and scholars in this country and abroad in efforts to improve our understanding of genomes and to explore the potential benefits of such genome projects

Activities Planned for 2009

- Continue to develop and implement the research necessary to rapidly and efficiently complete both large and small scale DNA sequencing projects using state-of-the art instrumentation.
- Maintain our focus of training the next generation of Oklahoma scientists in the latest techniques for recombinant DNA, genetic engineering, cloning and DNA sequencing,
- Aid collaborators in submission of grant proposals requiring DNA sequencing, computer analysis of DNA sequences, and DNA synthesis by serving as a state-wide resource for this technology,
- Improve our involvement in education and research by continuing to train students at both the graduate and undergraduate levels as well as address the national needs of megabase sequencing,
- Strengthen our role of serving as a magnet to attract additional highly qualified investigators and new faculty for Oklahoma universities, as well as provide in-service training and technology transfer to students and faculty both from other Oklahoma colleges and local industry.
- Expand the user base for the Bioinformatics Core Facility (BCF) that contains the computer programs necessary for genetic research in Oklahoma and the various data bases, i.e. GenBank, EMBL, and NBRF, the programs used to search these data bases. and the programs for DNA, RNA structure and functional analysis at the genome and proteome levels.

Core Competencies

- Developed, maintains and implements both 454/Roche GS-FLX-xl massively parallel automated DNA sequencing technology and ABI-3730 capillary sequencers
- Pioneered, maintains and develops robotic methods for DNA isolation and analysis
- Maintains a state of the art computational genomics facility for analysis of both DNA and gene expression data through the development of interactive relational databases
- Performs advanced research on comparative genomics, microbial community composition dynamics and gene expression
- Develops methods for visualization of genomic, microbial community and gene expression data.

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Co-Directors: Drs. Bruce A. Roe and
Tyrrell Conway

Linkages and Partnerships

- Continue our highly productive research collaboration with numerous OU faculty and staff in mega-microbial sequencing projects from soil, water, gut and feces.
- Maintain our collaborative research grants with external organizations including plant related groups, including for example, the Noble Foundation, Oklahoma State University, University of Minnesota and Cornell University, and others worldwide.
- Continue hosting and supporting national and international visiting students and scientists during our summer internship academic year programs as well as tours of our DNA sequencing, gene expression and computational biology facilities.

Recently Published Results

During 2008, we have published over 20 refereed journal articles including:

- studies of two ancient human microbiomes with graduate students Simone Macmil and Graham Wiley in collaboration with Dr. Cecil Lewis in the Department of Anthropology,
 - three papers comparing disease resistance regions of the soybean genome with those of *Medicago truncatula* (a relative of alfalfa and a model legume) with graduate students Shweta Deshpande, Majesta O'Blens Iryna Sanders and Jing Yi,
 - comparative sequencing of a highly transformable M49 Strain of *Streptococcus pyogenes* that causes inflammation of the kidney, with post doctoral fellow Fares Najar in collaboration with Drs. Joe Ferretti and William McShan at the OU Health Sciences Center,
 - a paper on microbial community studies in collaboration with Dr. Lee Krumholz in the Department of Microbiology, and
 - a paper comparing the carbon nutrition for pathogenic and commensal *Escherichia coli* strains in the mouse intestine from graduate students Andrew Fabich and Shari Jones.
- The full list of OU ACGT and BCF publications can be found at URLs:
http://www.genome.ou.edu/personnel/broe/roe_vitae.html and
<http://www.ou.edu/microarray/oubcf/docs/publications.shtml>, respectively.

Impacts and Outcomes of Center

The Advanced Center for Genome Technology is congruent with the State's goals of increasing the bio-medical industry in the state. The availability of such a unique state-wide accessible facility allows individual groups to expand their search by providing both the research expertise and the facilities needed to begin addressing larger and more global evolutionary and genomic organization questions. Individual researcher groups in Oklahoma access this facility by either sending samples for sequence analysis or bringing samples for analysis by the individual researcher, with training being provided by the DNA Sequencing Core Staff. Because we have long established relationships with researchers across the nation, we are in a strong position to continue to improve the State's reputation as a leader in biotechnology.

The Bioinformatics Core Facility improves the University's competitiveness for national and private grant funding. As the quality and throughput of life science research tools improve and the size of datasets grows, the funding agencies are asking researchers to have a plan for data management. The BCF can aid in data submission to the international databases and also has the potential for development of software products for public distribution.

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