
 Associate Research Professor – Manager DNA Sequencing Center

Department of Biology

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Experience

Fall 2018	BYU purchased a 2 nd instrument PacBio Sequel instrument	Demand for PacBio Sequencing is very high.
Fall 2016	BYU purchased a PacBio Sequel instrument	Training is finished and we are providing services to many in the research community
December 2014	BYU purchases an Illumina HiSeq 2500 instrument	We are now providing sequencing services on this platform to many groups including entities outside the BYU research community.
December 2011	BYU purchases an Illumina GAIIX	I am trained in its use and running as well as the initial data analysis for these runs
Fall 2011	Granted continuing faculty status Brigham Young University	This is the equivalent of tenure at other Universities
Fall 2008	BYU purchases a 454 Life Sciences Sciences Genome Sequencer	I am trained in its use and manage its day-to-day running and maintenance and data analysis
2005 – present	Associate Research Professor Manager DNA Sequencing Center	Brigham Young University: Department of Biology
1998 – 2005	Staff Scientist	National Institutes of Health (NIH), National Institute on Deafness and Other Communication Disorders (NIDCD), Laboratory of Molecular Genetics
2002	Our lab purchases 1 ABI 3730 & 1 ABI 3730xl DNA sequencer	I am one of two Staff Scientists trained in their use and these instruments became an essential part of my research
2001	Appointed Adjunct Faculty Member	Center of Excellence in Molecular Biology, University of the Punjab, Lahore, Pakistan
1994-1998	Senior Staff Fellow	Laboratory of Molecular Genetics, NIDCD, NIH
1993	Advanced Training	Advanced Linkage Course by Dr. J. Ott Columbia University
1992	Beginning Training	Beginning Linkage Course by Dr. J. Ott Columbia University
1990	Our lab purchased and ABI	This instrument is an essential component of DNA sequencing at that time
1989-1994	Senior Staff Fellow	Laboratory of Molecular Biology, NIDCD, NIH
1984-1989	Staff Scientist	Mycogen Corporation, San Diego, CA
1982-1984	Postdoctoral Fellow	University of California, San Diego Advisor: Dr. John S. O'Brien
1978-1982	Ph.D. Biochemistry & Research Assistant	University of California, Davis Advisor: Dr. John R. Whitaker
1975-1977	B.A. Biological Sciences	University of California, Davis
1973-1975	Missionary Service, Church of Jesus Christ of Latter Day Saints	Mexico Hermosillo Mission

Information Relating to my Work

Fall 2008 – to present:

Since the purchase of a second Sequel, we've been requested by PacBio to beta test a different approach to genomic sequencing. We will be working on this throughout December. We continue to spend most of our time preparing and then running multiple SMRTcells for large insert genomic libraries. When we purchased the Sequel, we found that we also needed 3 other pieces of equipment to make large fragment DNA libraries (a Megaruptor, a Fragment Analyzer and a Blue-Pippin size selection system). The College of Life Sciences and the Department of Biology found an additional \$80K in their budgets to fund these additional purchases, which was very helpful to us. With the purchase of the Sequel instrument we are supporting more genomic projects here and from outside users.

With the purchase of the Illumina HiSeq2500 instrument in December 2014, we are once again providing sequencing services to many laboratories at BYU as well as for research groups from as far away as Russia, Greece and Australia. There has been a gradual increase in usage over time. We are currently running at about 50% of the capacity of this machine. Recently, as part of the next generation DNA sequencing community and as a member of the ABRF society we participated in a collaborative study with the DSRG subgroup, comparing rRNA depletion kits in performing RNA-Seq experiments. I received the Distinguished Service Award from the College of Life Sciences, BYU at the start of Fall, 2011.

In August 2011, Roche agreed to upgrade our 454 Life Sciences Genome Sequencer FLX to the latest GS FLX+ at no cost to us. We believe this is in part due to the repair history on this instrument (an average of 4 runs per breakdown). After several attempts and subsequent repairs, the upgraded instrument passed target specifications on September 29, 2011. Since the upgrade, we have not had a repair issue and the run read lengths have been better than before (and they were not deficient before the upgrade).

In fall 2008, BYU acquired a 454 Life Sciences Genome Sequencer FLX. Since this purchase, my average 57-hour workweek is mostly focused on supporting this technology. There is a large commitment in hours once we receive a sample(s) to run; it takes approximately one week's labor before the data is ready for use by the investigator. Because of this effort, I was awarded a Distinguished Citizenship Award by the Department of Biology at the end of 2009. To be effective in our use of this instrument, I have undergone the following training. Initial training was with a Roche representative coming to BYU twice for several days each in Nov 2008 and again in Jan 2009, online meetings (Webinars), attendance at the two Roche 454 User Group meetings held in Hartford CT (Sept 2008) and in Providence RI (May 2010), accepting an invitation to visit and work for a week at the Arizona Genomics Institute at the University of Arizona (May 2009), and attending the Roche paired-end training meeting in Indianapolis, June 2009.

Starting in March 2010, with a year's worth of runs and work experience in second generation DNA sequencing, I started training Emily Nance, a BYU undergraduate, on how to prepare samples and perform runs with the 454 machine. She is successfully trained and now works full time (August 2010) in all phases of running this instrument (library construction, emulsion PCR, loading, and running this machine). I have since trained additional students as and when they are needed.

February 2005 – to Fall 2008:

Associate Research Professor responsible for the day-to-day management and maintenance of the DNA Sequencing Center at Brigham Young University. I retain a small portion of my time (10%) for research interests with former colleagues. For example, Dr. Sadaf Naz accepted a position as an Assistant Professor in the School of Biological Sciences, University of the Punjab, Lahore, Pakistan the summer after I left NIDCD employment. We have since started a collaboration that also includes Dr. Anil Lalwani, a former colleague from NIDCD and current Professor of Otolaryngology, New York University School of Medicine. Our focus is the enrollment of consanguineous Pakistani families segregating cleft lip with or without cleft palate. It took several years of effort to reach the current state where we are genotyping samples from three Pakistani families as we work to define loci responsible for this heterogenous genetic trait. Our current focus is to perform whole exome sequencing among affecteds as we look for deleterious mutations responsible for the phenotype segregating in these three families, each capable of supporting highly significant p-values if mutations are found.

February 1998 – January 2005:

Staff Scientist, Laboratory of Molecular Genetics, National Institute on Deafness and Other Communication Disorders (NIDCD), National Institutes of Health (NIH). At NIDCD, I was one of two investigators responsible for the maintenance and management of the NIDCD DNA sequencing facility. I was also maintaining an oligonucleotide synthesis service from soon after starting work at NIDCD. In 1994 while at NIDCD, I became the principal investigator of the Human Subjects Research Protocol entitled: Hereditary Hearing Impairment – gene mapping. I continued to maintain this protocol under two different Laboratory Chiefs up until the time I left NIH employment. From a similar collaboration, the National Eye Institute enrolled many suitable families segregating blindness and others at NIDCD enrolled suitable families segregating stuttering.

June 2001:

Appointed to an adjunct faculty position at the Center of Excellence in Molecular Biology (CEMB), University of the Punjab, Lahore, Pakistan with Dr. Sheikh Riazuddin, Director. I worked with three graduate students who worked at the Laboratory of Molecular Genetics while enrolled at the Center of Excellence in Molecular Biology, and all whom eventually obtained Ph.D.'s from CEMB.

February 1994 - 1998:

Senior Staff Fellow, Laboratory of Molecular Genetics, NIDCD, National Institutes of Health. In the first years of this fellowship, I was manager of the laboratory while NIDCD searched for a Laboratory Chief. During this time period I instigated the expansion of our India human subjects research protocol to include the National Centre of Excellence in Molecular Biology, Lahore, Pakistan.

August 1989 - February 1994:

Senior Staff Fellow, Laboratory of Molecular Biology, NIDCD, National Institutes of Health. During this time period I gained needed experience in Molecular Genetics, studying Waardenburg syndrome and generating the first ever cDNA library of inner ear messages. It was also during these years that I made my first trip to India to participate in the Indo-US

Symposium on “Mapping Genes for Deafness”, held at the All India Institute of Medical Sciences, Delhi, 1991. From this meeting, some of the participants developed the Human Subjects Research Protocol entitled: “Hereditary Hearing Impairment – gene mapping,” and the initial funding to start the project was sought and obtained through the U.S. held Rupee Fund in India (Principal Investigators were SK Kacker, IC Verma, J Fex and ER Wilcox).

May 1984 - July 1989:

Staff Scientist at Mycogen Corporation, San Diego, California. This successful biotechnology company has been mentioned as a model start-up in an article from Nature [Aaron Bouchie 2006. Getting the right mix. Nature 442(7105):860-1]. When I joined this company, there were 10-15 researchers with great expectations and little substance. The company grew in this 5-year period to over 100 employees. In 1998 it was purchased by Dow AgroSciences and is currently an industry leader in improved crop seed production. At the time of my employment, our focus was the development of novel insecticidal toxins from *Bacillus thuringiensis* and overexpression of these toxins in microbial hosts.

August 1982 - April 1984:

Postdoctoral Fellow at the University of California, San Diego, with Dr. John S. O'Brien as research advisor. Research experience was in the construction of cDNA libraries for the purposes of cloning human lysosomal enzymes, and in DNA and protein amino acid sequencing. Such enzymes are important to the characterization of human lysosomal storage disorders, such as Tay-Sachs disease.

October 1978 - August 1982:

Research Assistant at the University of California, Davis, with Dr. John R. Whitaker, former associate dean for the College of Agriculture, as my supervisor. Research experience was in non-steady state kinetics, steady state kinetics, protein purification and protein chemistry.

Recent Publications

82. Herbert ZT, Kershner JP, Butty V, Thimmapuram J, Choudhari S, Alekseyev YO, Fan J, Podnar JW, **Wilcox E**, Gipson J, Gillaspay A, Jepsen K, Bondurant SS, Morris K, Sommerville G, Grimmett L, Adams M, Levine SS. 2017. Cross-Site Comparison of Ribosomal Depletion Kits for Illumina RNASeq Library Construction. *Genome Biology*, submitted May 2017.

83. Yousaf R, Ahmed Z, Giese A, Morell R, Lagziel A, Dabdoub A, Wilcox E, Riazuddin S, Friedman T, Riazuddin S. 2017. Modifier variant of METTL13 suppresses human GAB1-associated profound deafness. *Journal of Clinical Investigation*, 2018;128(4):1509-1522.

Invited External Theses Examiner for students seeking a Ph.D. from the University of the Punjab

2018 – 3 thesis reviews so far

2017 – 5 thesis reviews were performed

2016 – 2 thesis reviews were performed

2015 – 4 thesis reviews were performed

2014 – 6 thesis reviews were performed

2013 – 5 thesis reviews were performed

2012 – 5 thesis reviews were performed
2011 – 5 thesis reviews were performed
2010 – 5 thesis reviews were performed
2009 – 3 thesis reviews were performed
2008 – 1 thesis review was performed

Consulting

March 2010, I accepted an invitation to become a consultant for Guidepoint Global, New York.
February 2009, I accepted an invitation to join Round Table Group's expert consultants.

Awards and Honors

2011 Distinguished Service Award from the College of Life Sciences, BYU
2009 Distinguished Citizenship Award from the Department of Biology, BYU
2003 Staff Recognition Award from NIDCD.
2002 Recognition of Mentorship award, NIDCD Partnership Program.
2001 Recognition of Mentorship award, NIDCD Partnership Program.
2000 Recipient of the NIH Director's Award for excellence in research.
1999 Recognition of Mentorship award, NIDCD Partnership program.
1999 Equal Employment Opportunity Award for special achievement.

Competitive Funds from outside BYU.

Aug 2005 Dr. Leigh Johnson was awarded an NSF, MRI grant for \$337,502 entitled: "Acquisition of DNA-manipulation robotics for increased throughput and data integrity in biological research, teaching and student research training." I was a contributing factor in applying this instrumentation for student and faculty use at BYU.

Sept 2008 Dr. Joshua Udall was awarded an NSF, MRI grant for \$630,000 entitled: "Acquisition of Genome Sequencer FLX system." I continue to be a contributing factor in applying this instrument for student and faculty use at BYU.

Aug 2016 Dr. Seth Bybee received an NSF, MRI submission seeking funds towards the purchase of a PacBio Sequel instrument. This, along with funds from the College of Life Sciences, towards the purchase of equipment needed in handling large DNA fragments was a significant addition to the DNA Sequencing Center.

Students trained

It takes about a year to train a student to work somewhat independently at the DNA Sequencing Center. Part of this learning is making costly mistakes while generating useable DNA sequence data. We do our best to minimize these mistakes. We are fortunate to have high quality student employees able to learn and apply what they learn. Over the past 13 years at BYU I've been fortunate to have trained and worked side-by-side with 30 undergraduate students.