ALEXANDER KOZIK

Bioinformatics Specialist
The UC Davis Genome Center
Genome and Biomedical Sciences Facility
451 Health Sciences Drive   Email: akozik@atgc.org
University of California   Phone: (530)-754-9127
Davis, CA 95616-8816   Cell: (530)-220-3385

Education:

- PhD in Genetics. 1996. Wageningen Agricultural University, The Netherlands.
- M.S. in Chemistry. 1987. St Petersburg State University, Russia

Research Interests

- Bioinformatics, large-scale data analysis, visualization and presentation.
- Managing of multiple projects, training of software developers.
- Development of strategies for large-scale data handling and processing.
- Database design and software development.
- Algorithm development, testing, troubleshooting and implementation.
- Data validation and refining, filtering of meaningful information from noisy data.
- High-density genetic maps construction and validation.
- Design and analysis of custom Affymetrix genome chips.
- Processing and analysis of DNA sequences from Solexa Genome Analyzer.

Professional History

- **2002 – current   Bioinformatics Specialist, UC Davis Genome Center.**
Development of strategies for large-scale data handling, data analysis, and presentation; managing multiple projects, training software developers, coordination of processes with lab scientists. Generation of genetic databases (in mySQL) [http://cgpdb.ucdavis.edu/]. Development of software applications for data analysis, visualization, and presentation. High-throughput EST/gene data processing and analysis. Development of tools to validate and visualize high-density genetic maps [http://cgpdb.ucdavis.edu/XLinkage/MadMapper/]. SFP (single feature polymorphism) and eQTL mapping using Affymetrix chip expression data for Arabidopsis RILs [http://elp.ucdavis.edu/]. Design and analysis of custom Affymetrix genome chips. Construction of high density lettuce genetic map. Processing and analysis of ultra high-throughput Solexa Genome Analyzer sequencing data.

- **2000 – 2002   Postdoctoral fellow, Department of Vegetable Crops, UC Davis.**
Studying the function of plant protein kinases and NBS-LRR genes (plant resistance to pathogens). Development of the database for the Arabidopsis plant resistance genes genome project http://niblrrs.ucdavis.edu/

- **1996 – 2000   Postdoctoral fellow, UC Davis School of Medicine.**
1. Chromosome structure in sperm cells. Analyzed chromosome telomere length in human populations and telomere-binding protein(s) in bovine.
2. Genetics of autoimmune diseases (lupus) in human. Performed data collection, processing, analysis, and genetic mapping.

- **1996 January – 1996 July Rutgers University, New Brunswick, New Jersey.**
Positional cloning of plant resistance genes in Arabidopsis.

- **1991 – 1996   PhD student, Wageningen Agricultural University.**
Plant-Microbe interaction, host specific interaction between Pea and rhizobia, fine genetic mapping of plant genes involved in symbiosis.

Programming languages:
- **Python**
- **Tcl/Tk**
- **PHP**
- **Perl**
- **R**

Selected computer programs developed:

- SNP/InDel discovery and analysis - for finding genetic differences between genomes:
  http://cgpdb.ucdavis.edu/SNP_Discovery/Py_ContigViewer/
  http://cgpdb.ucdavis.edu/SNP_Discovery_CDS/

- CheckMatrix and MadMapper- genetic maps validation and visualization:
  http://cgpdb.ucdavis.edu/XLinkage/MadMapper/

- GenomePixelizer - for visualizing of genome organization:
  http://www.atgc.org/GenomePixelizer/

- PhyloGrapher - graph drawing of biological data:
  http://www.atgc.org/PhyloGrapher/

- GenoPix2D plotter - for visualization of similarities between different genomes:
  http://www.atgc.org/GenoPix_2D_Plotter/

- TkLife - multipurpose visualization program:
  http://www.atgc.org/TkLife/

Publications

Heesacker A, Kishore VK, Gao W, Tang S, Kolkman JM, Gingle A, Matvienko M, Kozik A, Michelmore RM, Lai Z, Rieseberg LH, Knapp SJ.
SSRs and INDELs mined from the sunflower EST database: abundance, polymorphisms, and cross-taxa utility.
Theor Appl Genet. 2008 Jul 17. [Epub ahead of print] [PubMed: 18633591]

Radwan O, Gandhi S, Heesacker A, Whitaker B, Taylor C, Plocik A, Kesseli R, Kozik A, Michelmore RW, Knapp SJ.
Genetic diversity and genomic distribution of homologs encoding NBS-LRR disease resistance proteins in sunflower.
Mol Genet Genomics. 2008 Aug;280(2):111-125 [PubMed: 18553106]

Van Deynze AE, Stoffel K, Buell RC, Kozik A, Liu J, van der Knaap E, Francis D.
Diversity in conserved genes in tomato.
BMC Genomics. 2007 Dec 18;8(1):465 [PubMed: 18088428]

Tan X, Meyers BC, Kozik A, West MA, Morgante M, St Clair DA, Bent AF, Michelmore RW.
Global expression analysis of nucleotide binding site-leucine rich repeat-encoding and related genes in Arabidopsis.
BMC Plant Biol. 2007 Oct 23;7:56 [PubMed: 17956627]

Church SA, Livingstone K, Lai Z, <u>Kozik A</u>, Knapp SJ, Michelmore RW, Rieseberg LH.
Using variable rate models to identify genes under selection in sequence pairs: their validity and limitations for EST sequences.
J Mol Evol. 2007 Feb;64(2):171-180 [PubMed: 17200807]

Truco MJ, Antonise R, Lavelle D, Ochoa O, <u>Kozik A</u>, Witsenboer H, Fort SB, Jeuken MJ, Kesseli RV, Lindhout P, Michelmore RW, Peleman J.
A high-density, integrated genetic linkage map of lettuce (Lactuca spp.).
Theor Appl Genet. 2007 Oct;115(6):735-746 [PubMed: 17828385]

Krutovsky KV, Elsik CG, Matvienko M, <u>Kozik A</u>, Neale DB.
Conserved Ortholog Sets in forest trees.
Tree Genetics and Genomes. 2006 3:61-70

Timms L, Jimenez R, Chase M, Lavelle D, McHale L, <u>Kozik A</u>, Zhao L, Heesacker A, Knapp S, Rieseberg L, Michelmore R, Kesseli R.
Analyses of Synteny between Arabidopsis thaliana and Species in the Asteraceae Reveal a Complex Network of Small Syntenic Segments and Major Chromosomal Rearrangements.
Genetics. 2006 Aug;173(4):2227-2235. Epub 2006 Jun 18. [PubMed: 16783026]

West MA, van Leeuwen H, <u>Kozik A</u>, Kliebenstein DJ, Doerge RW, St Clair DA, Michelmore RW.
High-density haplotyping with microarray-based expression and single feature polymorphism markers in Arabidopsis.
Genome Res. 2006 Jun;16(6):787-795. Epub 2006 May 15. [PubMed: 16702412]

Bernal AJ, Pan Q, Pollack J, Rose L, <u>Kozik A</u>, Willits N, Luo Y, Guittet M, Kochetkova E, Michelmore R.
Functional analysis of the plant disease resistance gene Pto using DNA shuffling.
J Biol Chem. 2005 280(24): 23073-23083. Epub 2005 Mar 23. [PubMed: 15790558]

Cannon SB, <u>Kozik A</u>, Chan B, Michelmore R, Young ND.
DiagHunter and GenoPix2D: programs for genomic comparisons, large-scale homology discovery and visualization.
Genome Biol. 2003;4(10):R68. [PubMed: 14519203]

Meyers BC, <u>Kozik A</u>, Griego A, Kuang H, Michelmore RW.
Genome-wide analysis of NBS-LRR-encoding genes in Arabidopsis.
Plant Cell. 2003 Apr;15(4):809-834. [PubMed: 12671079]

<u>Kozik A</u>, Kochetkova E, Michelmore R.
GenomePixelizer-a visualization program for comparative genomics within and between species.
Bioinformatics 2002 18: 335-336. [PubMed: 11847088]

Participation in Plant & Animal Genomes Conferences (PAG) 2002-2008, San Diego, CA; Selected Posters and Presentations:

PAG-16, January 12-16, 2008:

Marta Matvienko, Alex Kozik, Richard Michelmore
Evaluation Of Technologies For Constructing And Sequencing cDNA Libraries
[http://www.intl-pag.org/16/abstracts/PAG16_P01_5.htm]

Alexander Kozik, Marta Matvienko, Ivan Kozik, Hans van Leeuwen, Allen Van Deynze, Richard Michelmore
Eukaryotic Ultra Conserved Orthologs And Estimation Of Gene Capture In EST Libraries
[http://www.intl-pag.org/16/abstracts/PAG16_P01_6.html]

J. Erron Haggard, Alexander Kozik, Carlos F. Quiros
Single Nucleotide Polymorphisms Between Coding Sequences Of The Brassica A And C Genomes
[http://www.intl-pag.org/16/abstracts/PAG16_P03e_160.html]

Allen E. Van Deynze, Kevin Stoffel, Alexander Kozik, Esther van der Knapp, Sung-Chur Sim, David Francis
Diversity In Conserved Genes In Tomato
[http://www.intl-pag.org/16/abstracts/PAG16_P03e_166.html]

Hans van Leeuwen, Kevin Stoffel, Smitha Mathrakott, Fallon Chen, Xiaoping Tan, Jiqiang Yao, Gene Wong, Xinping Cui, Alexander Kozik, María José Truco, Richard W Michelmore, Allen Van Deynze
Analysis Of Single Feature Polymorphism Markers With A Lettuce Affymetrix Genechip For Massively Parallel Marker Discovery, Genotyping And Mapping
[http://www.intl-pag.org/16/abstracts/PAG16_P03f_190.html]
[http://www.intl-pag.org/16/abstracts/PAG16_W16_124.html]

Jiqiang Yao, Jim Prince, Alexander Kozik, Allen Van Deynze
A Whole Genome Microarray Designed For Marker Discovery, Genotyping And Mapping In Pepper
[http://www.intl-pag.org/16/abstracts/PAG16_P03f_196.html]

Antonio Cabrera, Alex Kozik, Suneth S. Sooriyapathirana, Audrey Sebolt, Susan Hammar, James W. Olmstead, Gloria Iriarte, Dechun Wang, Guorong Zhang, Esther van der Knaap, Amy F. Iezzoni
Development Of Gene-Based Markers For Linkage Map Construction And QTL Analysis In Sweet Cherry (Prunus avium L.)
[http://www.intl-pag.org/16/abstracts/PAG16_P05h_472.html]

Leah K McHale, Maria Jose Truco, Alexander Kozik, Tadeusz Wroblewski, Dean O Lavelle, Oswaldo E Ochoa, Smitha Mathrakott, Richard W Michelmore
Genomic Architecture Of Disease Resistance In Lettuce
[http://www.intl-pag.org/16/abstracts/PAG16_P05r_646.html]

PAG-15, January 13-17, 2007:

David G Caldwell, Hans van Leeuwen, Kevin Stoffel, Fallon Chen, Alex Kozik, María José Truco, Richard W Michelmore, Allen Van Deynze
Development And Exploitation Of A Lettuce (Lactuca sativa) 6.6 Million Feature Affymetrix Genechip For Massively Parallel Genotyping And Gene Expression Analysis
[http://www.intl-pag.org/15/abstracts/PAG15_P03e_174.html]

María José Truco, Dean Lavelle, Leah McHale, Jason Argyris, David Caldwell, Marta Matvienko, Alex Kozik, Oswaldo Ochoa, Smitha Mathrakott, Kent Bradford, Loren Rieseberg, Steve Knapp, Rick Kesseli, David Still, Richard Michelmore
The Compositae Genome Project
[http://www.intl-pag.org/15/abstracts/PAG15_P05r_646.html]

Allen Van Deynze, Thea Wilkins, Kevin Stoffel, Mike Lee, David Stelly, Alex Kozik
A Set Of Informative Markers Designed Specifically For Breeding Cotton
[http://www.intl-pag.org/15/abstracts/PAG15_P05r_657.html]

Tadeusz Wroblewski, Boris Vinatzer, Katherine S Caldwell, Ursula Piskurewicz, Keri A Cavanaugh, Joanna Jelenska, Gail Teitzel, Leah K McHale, Huaqin Xu, Alexander Kozik, Oswaldo Ochoa, Luis A Williams, Jean T Greenberg, Richard W Michelmore
Comparative Large-Scale Analysis Of Resistance Gene Evolution
[http://www.intl-pag.org/15/abstracts/PAG15_P07b_766.html]

PAG-14, January 14-18, 2006:

Alexander Kozik, Richard Michelmore
Madmapper And Checkmatrix - Python Scripts To Infer Orders Of Genetic Markers And For Visualization And Validation Of Genetic Maps And Haplotypes
[http://www.intl-pag.org/14/abstracts/PAG14_C013.html]

David Caldwell, Alex Kozik, Fallon Chen, Mara Jose Truco, Richard Michelmore, Allen Van Deynze
Development Of A Lettuce (Lactuca sativa) 6.6 Million Feature Affymetrix Genechip For Massively Parallel Genotyping And Gene Expression Analysis
[http://www.intl-pag.org/14/abstracts/PAG14_P183.html]

Maria Jose Truco, Dean Lavelle, Leah McHale, Jason Argyris, David Caldwell, Marta Matvienko, Alex Kozik, Oswaldo Ochoa, Smitha Mathrakott, Kent Bradford, Loren Rieseberg, Steve Knapp, Rick Kesseli, David Still, Richard Michelmore
Comparative EST Sequencing Of Seventeen Compositae Species
[http://www.intl-pag.org/14/abstracts/PAG14_P672.html]

Hans van Leeuwen, Marilyn West, Alexander Kozik, Daniel Kliebenstein, Rebecca Doerge, Dina St.Clair, Richard Michelmore
High-Density Haplotyping With Microarray-Based Single Feature Polymorphism Markers In Arabidopsis
[http://www.intl-pag.org/14/abstracts/PAG14_P751.html]

Marilyn West, Hans van Leeuwen, Alexander Kozik, Daniel Kliebenstein, Richard Michelmore, Rebecca Doerge, Dina St.Clair
Gene Expression Markers: Using Transcript Levels Obtained From Microarrays To Genotype A Segregating Population
[http://www.intl-pag.org/14/abstracts/PAG14_P761.html]

David Caldwell, Maria Jose Truco, Alex Kozik, Leah K McHale, Dean O Lavelle, Smitha Mathrakott, Oswaldo Ochoa, Fallon Chen, Allen Van Deynze, Richard Michelmore
Lettuce Genomics And Exploitation Of Information Generated By The Compositae Genome Project
[http://www.intl-pag.org/14/abstracts/PAG14_W87.html]

PAG-13, January 15-19, 2005:

Alexander Kozik, Steve Edberg, Barnaly Pande, David Caldwell, David Lee, Travis Kleeburg, Fallon Chen, Richard Michelmore
High-Throughput Mapping Pipeline Of EST Based Sequences On Lettuce Genome. Genetic Map Validation, Visualization And Web Presentation
[http://www.intl-pag.org/pag/13/abstracts/PAG13_P250.html]

Marta Matvienko, Alexander Kozik
Biologist-Friendly Pipeline For Processing And Masking Sequences
[http://www.intl-pag.org/pag/13/abstracts/PAG13_P042.html]

Leah K McHale, Tadeusz Wroblewski, Urszula Piskurewicz, Keri Cavanaugh, Barnaly Pande, Alexander Kozik, Maria Jose Truco, Oswaldo Ochoa, Dean Lavelle, Richard Michelmore
The Genetic Architecture Of Disease Resistance In Lactuca sativa
[http://www.intl-pag.org/pag/13/abstracts/PAG13_W069.html]

Lee Timms, Leah McHale, Alex Kozik, Rosmery Soris, Mike Chase, Patricia Szczys, Rick V Kesseli
Identifying And Characterizing Regions Of Synteny Between Lettuce, Sunflower And Arabidopsis
[http://www.intl-pag.org/pag/13/abstracts/PAG13_W070.html]

PAG-12, January 10-14, 2004:

Alexander Kozik, Richard Michelmore
ANALYSIS AND VISUALIZATION OF SINGLE COPY ORTHOLOGS IN ARABIDOPSIS, LETTUCE, SUNFLOWER AND OTHER PLANT SPECIES
[http://www.intl-pag.org/pag/12/abstracts/P5a_PAG12_345.html]

Leah K McHale, Dean O Lavelle, Barnaly Pande, Maria Jose Truco, Smitha Suresh, Alexander Kozik, Oswaldo Ochoa, Tadeusz Wroblewski, Richard Michelmore
IDENTIFICATION AND MAPPING OF CANDIDATE GENES INVOLVED IN DISEASE RESISTANCE IN LETTUCE
[http://www.intl-pag.org/pag/12/abstracts/P5q_PAG12_749.html]

Barnaly Pande, Leah McHale, Dean Lavelle, Maria-Jose Truco, Alex Kozik, Tadeusz Wroblewski, Mike Chase, Smitha Suresh, Oswaldo Ochoa, Rosemary Soris, Deidre Morgan, Rick Kesseli, Richard Michelmore
CANDIDATE GENE ANALYSIS FOR AGRICULTURALLY IMPORTANT TRAITS IN LETTUCE
[http://www.intl-pag.org/pag/12/abstracts/W17_PAG12_56.html]

PAG-11, January 11-15, 2003:

<u>Alexander Kozik</u>, Dean Lavelle, Maria Jose Truco, Barnaly Pande, Judith Kolkman, Leah McHale, Mary Slabaugh, Loren Rieseberg, Steven Knapp, Richard Michelmore
ANALYSIS OF LETTUCE AND SUNFLOWER ESTS FROM THE COMPOSITAE GENOME PROJECT
[http://www.intl-pag.org/pag/11/abstracts/W15_W97_XI.html]

<u>Alexander Kozik</u>, Brian Chan, Richard Michelmore
LETTUCE/SUNFLOWER EST CGPDB PROJECT: DATA ANALYSIS, ASSEMBLY VISUALIZATION AND VALIDATION
[http://www.intl-pag.org/pag/11/abstracts/P10b_P886_XI.html]

Dean Lavelle, Leah McHale, <u>Alexander Kozik</u>, Pi-hsia Su, Maria Jose Truco, Barnaly Pande, Smitha Suresh, Rik van Wijk, Johan Peleman, Richard Michelmore
GENERATION OF CANDIDATE GENE MOLECULAR MARKERS IN LETTUCE FROM ASSEMBLED EST SEQUENCES IN THE COMPOSITAE GENOME PROJECT
[http://www.intl-pag.org/pag/11/abstracts/P5q_P691_XI.html]

Marta Matvienko, Ivan Kozik, <u>Alexander Kozik</u>
COMPARISON OF ARABIDOPSIS VS. YEAST, HUMAN, AND WORM GENOMES
[http://www.intl-pag.org/pag/11/abstracts/P3a_P138_XI.html]

Adam Heesacker, Venkata Kishore, Judith Kolkman, Mary Slabaugh, Shunxue Tang, <u>Alexander Kozik</u>, Richard Michelmore, Steven Knapp
SIMPLE SEQUENCE REPEATS MINED FROM SUNFLOWER EXPRESSED SEQUENCE TAGS
[http://www.intl-pag.org/pag/11/abstracts/P3b_P186_XI.html]

PAG-10, January 12-16, 2002:

<u>Alexander Kozik</u>, Elena Kochetkova, Richard Michelmore
GenomePixelizer - A VISUALIZATION TOOL FOR COMPARATIVE GENOMICS WITHIN AND BETWEEN SPECIES
[http://www.intl-pag.org/pag/10/abstracts/PAGX_P788.html]

Padma Sudarshana, Steve Edberg, Marie Nydam, <u>Alex Kozik</u>, Steven Knapp, Richard Michelmore
COMPOSITDB: THE COMPOSITAE GENOME DATABASE
[http://www.intl-pag.org/pag/10/abstracts/PAGX_P818.html]

Janet Ziegle, Marta Matvienko, <u>Alex Kozik</u>, Mireille van Damme, Judith Kolkman, Dean Lavelle, Larry Joe, Hong Lin, Ana Fidanstef, Parminder Sahota, Phil Chevalier, Kimberly Marshall, David Rosenfeld, Steve Knapp, Richard Michelmore
MAXIMIZING GENE DISCOVERY IN LETTUCE AND SUNFLOWER
[http://www.intl-pag.org/pag/10/abstracts/PAGX_W73.html]