

CHARU G. KUMAR

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EDUCATION

Ph.D., Animal Sciences 2001–2008

University of Illinois, Urbana-Champaign, IL

Advisor: Harris A. Lewin, Ph.D.

Thesis title: *Novel lineage-specific genes expressed in cattle placenta: discovery, functional annotation and evolution*

M.S., Biochemistry, Molecular Biology and Biophysics 1990-1993

University of Minnesota, Minneapolis/St.Paul, MN

Advisor: Michael A. Raftery, PhD.

Thesis title: *Topographic images of metal mercaptide derivatives of alpha-Bungarotoxin, a nicotinic Acetylcholine receptor antagonist, using Scanning Tunneling Microscopy.*

M.Phil. Chemistry 1988-1990

University of Delhi, Delhi, India

Advisor: A.N. Maitra, PhD.

Thesis title: *Studies of lecithin gels in biocompatible oils.*

M.Sc. Chemistry 1986-1988

Indian Institute For Technology, Kanpur, India

Advisor: P.Gupta-Bhaiya, PhD.

Thesis title: *Study of Cardiolipin bilayer lipid membrane*

B.Sc. Chemistry 1983-1986

University of Delhi, Delhi, India

HONORS & AWARDS

- Sigma Delta, The Honor Society of Agriculture, UIUC chapter, IL
- Parkland College Dean's List in Computer Science, Champaign, IL 1999

WORK AND RESEARCH EXPERIENCE

Research Assistant Professor, Department of Bioengineering February 2013—present
Systems and Computational Biology Group

Postdoctoral Research Associate May 2010–January 2013
Institute for Genomic Biology, University of Illinois, Research Group for Computational & Systems Biology

Mentor: Nathan D. Price, Ph.D., Department of Chemical Engineering, University of Illinois at Urbana-Champaign. Presently Associate Professor, Institute for Systems Biology, Seattle, WA.

- Genome-scale assembly, functional annotation, and metabolic model of *Halomonas sulfidaeris* *Esulfide1*.

- Assembly, comparative annotation and metabolic pathway reconstruction of deep subsurface metagenomic microbial communities.
- Evolution of signaling networks in astrocyte phenotypes.

Affiliate Research Associate.

January 2009–2010

Institute for Genomic Biology, University of Illinois

- Wrote and submitted an NRSA grant proposal to NIH.
- Audited medical neuroscience course.

Graduate Research Assistant

August 2001–2008

Department of Animal Sciences, University of Illinois, Research Group for Comparative Mammalian BiologyAdvisor: Harris A. Lewin, Ph.D., Vice Chancellor of Research, University of California, Davis. (Prior position held: Director, Institute for Genomic Biology, University of Illinois)

- Identified novel lineage-specific genes in cattle using bioinformatics and comparative genomics.
- Functionally characterized the novel genes using co-expression analysis of tissue-specific microarray data and regulatory networks.

Senior Program Analyst

December 1999–2001

W.M. Keck Center, Bioinformatics Unit, University of Illinois

- Developed pipelines and published ESTIMA tool for automation and visualization of sequence assembly, annotation, GeneOntology-based tree querying.
- Processed and analyzed projects for cDNA microarray libraries.

Teaching Assistant

August 1990–1993

Department of Biochemistry, Molecular Biology and Biophysics, University of Minnesota, Minneapolis/St.PaulAdvisor: Michael A. Raftery, Ph.D.

- Taught Biochemistry courses
- Studied the binding of antagonist, alpha-Bungarotoxin, to acetylcholine receptor using ligand binding studies and Scanning Tunneling Microscopy.

PUBLICATIONS

- 1) Kumar CG, Price ND. Evolutionary origin of signaling networks in astrocytes and their differential expression in glioblastoma. In preparation.
- 2) Kumar CG, Yiran Dong, Gary J. Olsen, Pan-Jun Kim, Isaac K.O. Cann, Roderick Mackie, Bruce W. Fouke, and Nathan D. Price. *H. sulfidaeris*: metabolic strategy unites hydrothermal vents and subsurface arenite rocks. To be submitted.
- 3) Yiran Dong, Kumar CG, Pan-Jun Kim, Nicolas Chia, Theodore Flynn, Philip Miller, Isaac Cann, Roderick Mackie, Nathan D. Price, Robert Sanford, Mayandi Sivaguru, and Bruce Fouke. Halomonas sulfidaeris-dominated microbial community inhabits a 1.8 km-deep subsurface Cambrian Sandstone reservoir, *Environmental Microbiology*, 2014. doi: 10.1111/1462-2920.12325. [Epub ahead of print]

- 4) Cohen-Zinder M, Donthu R, Larkin DM, Kumar CG, Rodriguez-Zas SL, Andropolis KE, Oliveira R, Lewin HA. Multisite haplotype on cattle chromosome 3 is associated with quantitative trait locus effects on lactation traits. *Physiol Genomics*. 2011, **43**:1185-97.
- 5) Kumar CG, Everts RE, Loor JJ, Lewin HA. Functional inference of lineage-specific transcripts from cattle placenta using co-expression analysis, *BMC Genomics*, 2010, **11**:161.
- 6) Cattle genome consortium, coauthor, gene annotation. The Genome Sequence of Taurine Cattle: A window to ruminant biology and evolution. *Science*, 2009, **324**:522-8.
- 7) Kumar CG, Larson JH, Band MR, Lewin HA. Discovery and characterization of 91 novel transcripts expressed in cattle placenta. *BMC Genomics*. 2007, **8**:113.
- 8) Larson JH, Kumar CG, Everts RE, Green CA, Everts-van der Wind A, Band MR, Lewin HA. Discovery of eight novel divergent homologs expressed in cattle placenta. *Physiol Genomics* 2006, **25**:405-13.
- 9) Kumar CG, LeDuc R, Gong G, Roinishivili L, Lewin HA, Liu L. ESTIMA, a Tool for EST Management in a Multi-Project Environment. *BMC Bioinformatics* 2004, **5**:176.
- 10) Everts RE, Band MR, Liu ZL, Kumar CG, Liu L, Loor JJ, Oliveira R, Lewin HA. A 7872 cDNA microarray and its use in bovine functional genomics. *Vet Immunol Immunopathol*. 2005, **105**:235-45.
- 11) Lewin HA, Larson, JH and Kumar CG. Comparative Mammalian Genomics and Adaptive Evolution: Divergent Homologs and Novel Genes in the Cattle Genome. In: *S.P. Wasser (ed.) Evolutionary Theory and Processes: Modern Horizons, Papers in Honor of Eviator Nevo, 2003*. Kluwer Academic Publishers, The Netherlands.
- 12) Whitfield CW, Band MR, Bonaldo MF, Kumar CG, Liu L, Pardinas JR, Robertson HM, Soares MB, Robinson GE. Annotated expressed sequence tags and cDNA microarrays for studies of brain and behavior in the honey bee. *Genome Res*. 2002, **12**:555-66.

PRESENTATIONS

- Kumar CG, Price ND. Evolutionary origin of signaling pathways in astrocytes and glioblastoma. Systems Biology & the Brain: 2013 International Symposium, April 14-15, 2013, Institute for Systems Biology, Seattle, WA.
- Kumar CG, Dong Y, Kim P-J, Olsen GJ, Caan IKO, Mackie R, Fouke BW, Price ND. Comparative metabolic predictions for *Halomonas sulfidaeris* inhabiting km-deep marine hydrothermal vents and subsurface sedimentary rocks. Eleventh Cold Spring Harbor Laboratory/Wellcome Trust conference on *Genome Informatics*, November 2--5 2011, Cold Spring Harbor, New York, NY
- Kumar CG, Everts RE, Larson JH, Loor JJ, Band MR, Lewin HA. Novel lineage-specific genes expressed in cattle placenta: discovery, functional annotation and evolution. *The bovine genome consortium*. Cold Spring Harbor Laboratory/Wellcome Trust conference, May 9-11 2009, Cold Spring Harbor, New York. Talk and poster.
- Kumar CG, Larson JH, Band MR, and Lewin HA. Identification and bioinformatics characterization of novel mammalian transcripts expressed in bovine placenta. Fifth Cold Spring Harbor Laboratory/Wellcome Trust conference on *Genome Informatics*, October 28-November 1 2005, Cold Spring Harbor, New York, NY.
- Kumar C.G., Larson J.H., Band M.R., and Lewin H.A. Identification and bioinformatic

characterization of novel mammalian genes expressed in bovine placenta. *7th Annual Conference in Computational Genomics*, Reston, Virginia, October 21-24, 2004.

- Kumar C.G., S.S. Davis, G. Gong, S. Natarajan, H.A. Lewin, L. Liu, ESTIMA: An EST Information Management And Annotation Tool, Computer-demo and poster presented at *Plant, Animal & Microbe Genomes X*, San Diego, California, January 12--16, 2002

MEETINGS AND TRAINING IN BIOINFORMATICS AND GENOMICS

- Society for Neuroscience 2011, Washington, DC, November 12--16, 2011.
- Joint CSHL/Wellcome Trust conference on Integrated approaches to Brain complexity, Hinxton, Cambridge UK, September 28—30, 2006.
- Bioinformatics tools for comparative genomics, Berkeley, CA, November 4—8, 2002
- Databasing the brain, EU-US workshop, Oslo, Norway, July 1—2, 2001.
- Object-oriented programming and database algorithms, Parkland College, Champaign, IL, 1997-1999
- DNA technology, STM, Receptor and lipid analysis

SCIENTIFIC JOURNAL MEMBERSHIP

- American Association for the Advancement of Science (AAAS), 2001-present
- Society for Neuroscience (SfN), 2011-present

ARTICLES REVIEWED FOR SCIENTIFIC JOURNALS

- BMC Systems Biology
- BMC Bioinformatics
- BMC Genomics

TEACHING AND MENTORING EXPERIENCE

- Mayo-Illinois Alliance 2013 summer teaching workshop. Taught Systems Biology module.
- Systems Biology-Metabolic Engineering course, Spring 2014.
- Mentor to I-Promise undergraduate students, 2012-
- Part-time Faculty, Chemistry 101, Parkland College, Champaign, 1997

UNDERGRADUATE/GRADUATE STUDENT ACTIVITIES

- Joint research supervisor for one graduate research assistant Jason Cho, Computer Science (Spring 2014).
- Research supervisor since Spring 2013 for a total of eight undergraduates, and financially support for research work for Jacob Guggenheim, BioE, UIUC, Summer 2013, Spring 2014. He and five other BioE undergraduates, Neil Bruyere, Joseph Sombeck, Howard Dabbous, Abhishek Deshpande, and Sarthak Grover, will continue research/independent studies in my group in 2014.