HERBERT M. SAURO

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PROFESSIONAL OBJECTIVES

- To develop a teaching program for molecular biologists in quantitative, computational and systems approaches to better understand living cells.

- To establish a vigorous and cutting edge quantitative research group in computational systems biology and bioengineering.

EDUCATION

Ph.D.

Oxford Brookes University   UK 1986
Major: Computational Biochemistry
Advisor: Professor David Fell
Research Interests: Metabolic and signal transduction networks, simulation, non-linear dynamics, control analysis, software development.

M.Sc.

University of York York   UK 1982
Major: Biological Computation
Content: Calculus, linear algebra, statistics, numerical analysis, computing, simulation, databases.

B.Sc. (honors)

University of Kent Canterbury   UK 1981
Major: Biochemistry/Microbiology

Post Graduate Certificate in Education

Aberystwyth,   UK, 1994
University of Aberystwyth

PROFESSIONAL HISTORY

Roslin Research Centre   Midlothian, Edinburgh 1986-1987
Postdoctoral Fellow Computer Simulation of Methionine Metabolism

University of Edinburgh   Edinburgh 1988-1991
Postdoctoral Fellow with Henrik Kacser, Department of Genetics. Mathematical Analysis of Cellular Networks

University of Aberystwyth   UK 1992-1993
Postdoctoral Fellow Application of Neural Networks in Biochemistry

High School Teacher   UK 1994-1996
Science and IT Teacher to students aged 11-18

Future Skills Software   UK 1994-1997
Director. Developing and Marketing Science Based Educational Software for the UK Market

Financial Times, Edinburgh   UK 1998
Database and User Interface Design

General Electric, Edinburgh   UK 1998-1999
Senior Database and User Interface Designer

Caltech, Pasadena, CA   USA 2000-present
Visiting Associate it Caltech with John Doyle and Hamid Bolouri (developing SBML)

Keck Graduate Institute, Claremont, CA   USA 2002-present
Assistant Professor

Currently Held Federal Grants:

NSF (2004-2007)   Understanding the computational role of cellular networks

NSF (2005-2010)   Structure and Origins of Functional Modules. (Co-PI, Pi David Galas).

DARPA (2002-2004)   Development of model fitting and bifurcation analysis software for BioSPICE and SBW (Completed)

DARPA (2005-2006)   Curation of Models, support for SBW development, including parallelization of data fitting for large scale models, completion of bifurcation tool.

DOE (2004-2007)   Development of SBW, graphical user interfaces, development of new numerical methods for large systems.

SYNERGISTIC ACTIVITIES

- Senior scientific advisor on systems biology to the NIH

- Editorial Activities: Referee for
  1. Bioinformatics
  2. Journal of Theoretical Biology
  3. Biophysical Journal
  4. Biosystems
  5. PLoS
  6. Development
  7. Nature Biotechnology
  8. IEE Systems Biology Journal
  9. IEEE Comp Bio and Bioinformatics
  10. Bulletin of Mathematical Society
  11. Journal of the Royal Society
  12. Nature

- Associate editor for the new journal: Systems and Synthetic Biology.

- Grant Reviewer for: NIH, NSF and the DOE.

- Founding member of the RTK (Receptor Tyrosine Kinase) Consortium

- Visiting Associate at Caltech in the Control and Dynamical Systems Group with John Doyle.

- Co-Chair for the Data Integration BioCOMP/DARPA group.

- Founding and active member of the SBML community.

- Program committee: ECAL 2005 - VIIIth European Conference on Artificial Life

- Awarded certificate of outstanding contribution to the BioSPICE/DARPA project.

PUBLICATION LIST

Sauro HM: The Next Frontier in Cellular Networking: 2005, The Scientist, Volume 19, p20-21

Chickarmane V, Paladugu SR, Bergmann F, Sauro HM. Bifurcation discovery tool. Bioinformatics. 2005 Sep 15;21(18):3688-90

Wellock C, Chickarmane V, Sauro HM. The SBW-MATLAB Interface. Bioinformatics. 2004 Nov 5.

Deckard A, Sauro HM. Preliminary studies on the in silico evolution of biochemical networks. Chembiochem. 2004 Oct 4;5(10):1423-31.

Sauro HM, Kholodenko BN. Quantitative analysis of signaling networks. Prog Biophys Mol Biol. 2004 Sep;86(1):5-43. Review.

Sauro. H M and Ingalls B (2004) Conservation analysis in biochemical networks: computational issues for software writers. Biophys Chem. 2004 Apr 1;109(1):1-15.

Sauro. H M (2004 The Computational Versatility of Proteomic Signaling Networks. Current Proteomics, 2004, 1, 67-81.

Aguda, B., and Sauro, H. M (2004) Computer Simulation of MAPK Signal Transduction in Methods Mol Biol. MAPK Signalling (R. Seger, Ed.), Humana Press, New Jersey, 2004; 250: 167-76.

Sauro HM, Hucka M, Finney A, Wellock C, Bolouri H, Doyle J and Kitano H. (2003) Next generation simulation tools: the Systems Biology Workbench and BioSPICE integration. OMICS. 2003 Winter;7(4):355-72.

Ingalls BP and Sauro H M. (2003) Sensitivity analysis of stoichiometric networks: an extension of metabolic control analysis to non-steady state trajectories. J Theor Biol. 2003 May 7;222(1):23-36.

Hucka M, Finney A, Sauro HM, Bolouri H, Doyle JC, Kitano H, Arkin AP, Bornstein BJ, Bray D, Cornish-Bowden A, Cuellar AA, Dronov S, Gilles ED, Ginkel M, Gor V, Goryanin II, Hedley WJ, Hodgman TC, Hofmeyr JH, Hunter PJ, Juty NS, Kasberger JL, Kremling A, Kummer U, Le Novere N, Loew LM, Lucio D, Mendes P, Minch E, Mjolsness ED, Nakayama Y, Nelson MR, Nielsen PF, Sakurada T, Schaff JC, Shapiro BE, Shimizu TS, Spence HD, Stelling J, Takahashi K, Tomita M, Wagner J, Wang J; SBML Forum.(2003) The systems biology markup language (SBML): a medium for representation and exchange of biochemical network models. Bioinformatics. 2003 Mar 1;19(4):524-31.

HUCKA M, FINNEY A, SAURO HM, BOLOURI H, DOYLE J, KITANO H. (2002) The ERATO Systems Biology Workbench: enabling interaction and exchange between software tools for computational biology. Pac Symp Biocomput. 2002:450-61.

HUCKA, M., FINNEY, A., SAURO, H., BOLOURI, H., DOYLE, J., KITANO, H. The ERATO Systems Biology Workbench: An Integrated Environment for Multiscale and Multitheoretic Simulations in Systems Biology. Foundations in System Biology, ed, Hiroaki Kitano, MIT Press, 2001.

WOODS J. H and SAURO H. M. (1997) Elasticities in Metabolic Control Analysis: algebraic derivation of simplified expressions. CABIOS (now BioInformatics) 13 (2), 123-130.

SAURO H. M (1997) Exploring Mathematical Functions using vExplorer. Future Skill Software.

SAURO H. M (1997) Introduction to Error Analysis in Experimentation using EasyGraph professional. Future Skill Software.

SAURO H. M. (1997) The Periodic Table. Published by: Future Skill Software.

SAURO H. M. (1996) Creatures and Population Modeling. Published by: Future Skill Software.

SAURO H. M (1996) Introduction to Mathematical Modeling using Fplot. Published by: Future Skill Software.

SAURO H. M (1995) User Reference Manual EasyGraph. Published by: Future Skill Software.

KHOLODENKO B. N, SAURO H. M. and WESTERHOFF H V. (1995) Coenzyme Cycles and Metabolic Control Analysis: The Determination of the Elasticity Coefficients from the Generalised Connectivity Theorem. Biochemistry and Molecular Biology, 33 (3), 615-625.

SAURO, H. M. and BARRETT, J., (1995) in vitro Control Analysis of Metabolic Pathways; experimental and analytical developments. Molecular and Cellular Biochemistry, 145, 141-150.

SAURO, H. M., KHOLODENKO, B. N., and WESTERHOFF, H. (1994) Metabolic Control Analysis of Linked Moiety-conserved Cycles. Responses to perturbations of internal variables and conservation totals. Eur. J. Biochem, 225, 179-186.

SAURO, H. M., (1994) Moiety-Conserved Cycles and Metabolic Control Analysis. Analysis of Sequestration and Metabolic Channelling. Biosystems, 33, 55-67.

SAURO, H. M., (1994) Analyses and Simulators: a brief description of two computer programs SCAMP and iMAP. Biothermokinetics. Ed: Westerhoff, H, Plenum Press, New York, 213-223.

SAURO, H. M., (1993) A Biochemical 'NAND' Gate and Assorted Circuits. Modern Trends in Biothermokinetics. Ed: Schuster S. et al, Plenum Press, New York, 133-140.

KELL D. B, DAVEY C. L, GOODACRE R and SAURO, H. M., (1993) When Going Backwards Means Progress: On the solution of biochemical inverse problems using artificial neural networks. Modern Trends in Biothermokinetics. Ed: Schuster S. et al, Plenum Press, New York, 109-114.

SAURO. H. M., (1993) SCAMP: a general-purpose simulator and metabolic control analysis program. CABIOS, 9 (4), 441-450.

SAURO H. M. and KELL, D., (1992) Evaluation of Steady-state Kinetic Parameters of Metabolic Pathways using Neural Networks. Binary, 4, 189-190.

SAURO, H.M and FELL, D.A. (1991), SCAMP: A metabolic simulator and control analysis program., Mathl. Comput. Modelling, 15, 15-28.

FELL D. A. and SAURO H. M., (1990) Metabolic Control Analysis: the effect of high enzyme concentrations. Eur. J. Biochem., 192, 183-187.

FELL, D. A. and SAURO, H. M., (1990) Metabolic Control Analysis by Computer: Progress and prospects., Biomed. Biochem. Acta, 8/9, 811-816.

SAURO H. M. and KACSER H., (1989) Enzyme-enzyme interactions and control analysis 2. The case of nonindependence: heterologous associations. Eur. J. Biochem., 187, 493-500.

KACSER H., SAURO H. M., ACERENZA L., (1989) Enzyme-enzyme interactions and control analysis 1. The case of non-additivity: monomer-oligomer associations. Eur. J. Biochem., 187, 481-491.

ACERENZA L., SAURO H. M and KACSER H., (1989) Control Analysis of Time-dependent Metabolic Systems. J. Theor. Biol., 137, 423-444.

SAURO H. M., SMALL J. R., FELL D. A., (1987) Metabolic control and its analysis: Extensions to the theory and matrix method. Eur. J. Biochem. 1987, 165, 215-221.

SAURO H. M., (1986) Control Analysis and Simulation of Metabolism Ph.D. Thesis, Oxford Polytechnic.

FELL D. A. and SAURO H. M., (1985) Metabolic Control and its Analysis: Additional Relationships between Elasticities and Control Coefficients. Eur. J. Biochem., 148, 555-561.

SAURO H. M., (1986) Control Analysis and Simulation of Metabolism Ph.D. Thesis, Oxford Polytechnic.

Conference Proceedings

FELL D. A. and SAURO H. M., (1985) Substrate cycles: do they really cause amplification? Biochem. Soc. Trans., 13, 762-763.

FELL D. A. and SAURO H. M., (1986) Non-equilibrium/equilibrium reactions: which controls? Biochem. Soc. Trans., 14, 624-625.

SAURO H. M. and FELL D. A., (1987) The role of co-operativity in metabolism. Biochem. Soc. Trans. 1987, 15, 234-235.

FELL, D. A., SAURO, H. M. and SMALL, J R., (1988) "Le calcul des coefficients de controle parl'algebre matricielle." Le controle du metabolisme Ed: Mazat, J.P. and Reder C., Published by Universite de Bordeaux II, Bordeaux.

FELL D. A., SAURO H. M., and SMALL J. R. (1990) Ch. 9, 139-148, Control coefficients and the matrix method.

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SAURO H. M., (1990) Ch. 17, 225-230, Quantification of metabolic regulation by effectors. Control of Metabolic Processes. (Cornish-Bowden, A.& Cardenas, M.L. eds.) NATO ASI Series, plenum Press, New York.

KACSER H., SAURO H. M., and ACERENZA L., (1990) Ch. 20, 251-257, Control analysis of systems with enzyme-enzyme interactions. Control of Metabolic Processes. (Cornish-Bowden, A.& Cardenas, M.L. eds.) NATO ASI Series, plenum Press, New York.

SAURO, H. M., (2000) Ch. 33, 221-228, Jarnac: a system for interactive metabolic analysis. Animating the Cellular Map 9th International BioThermoKinetics Meeting (eds: Hofmeyr, J-H. S, Rohwer, J. M, Snoep J. L) Stellenbosch University Press, ISBN 0-7972-0776-7.

SAURO, H. M., (2000) Ch. 4, Jarnac: An Interactive Metabolic Systems Language in Computation in Cells: Proceedings of an EPSRC Emerging Computing Paradigms Workshop Bolouri, Hamid & Paton, Raymond C (Editors), Dept. of Computer Science Technical Report No. 345, University of Hertfordshire, UK, April 2000.

Presentation at The First International Conference on Systems Biology (ICSB2000), Tokyo, Japan, November 2000, put together by Herbert Sauro, Michael Hucka, Andrew Finney and presented by Hamid Bolouri.

HUCKA M, SAURO H. M, FINNEY A, BOLOURI H, DOYLE J, KITANO H, Foundations of Systems Biology, ed. Hiroaki Kitano, MIT Press, Cambridge, Massachusetts, 2001 Presentation at the First International Symposium on Computational Cell Biology, Lenox, Massachusetts, USA, March 2001.

FINNEY A, HUCKA M, SAURO H. M, BOLOURI H, DOYLE J, KITANO H. First presented at the First International Symposium on Computational Cell Biology, Lenox, Massachusetts, USA, March 2001.

SAURO H. M,. A Rationale for the 'Design' of the MAP Kinase Pathway, Presentation at the second international conference on systems biology, 2001, Caltech.

Workshops

Third Workshop on Software Platforms for Systems Biology, June 2001, ERATO Kitano Systems Biology Project. Held at Caltech.

Fourth Workshop on Software Platforms for Systems Biology, November 2001, ERATO Kitano Systems Biology Project. Held at Caltech.

Workshop on modeling cellular processes at University of Stellenbosch, 10-14 April 2000, see http://www.sun.ac.za/biochem/btk/workshop.html

Second Workshop on Software Platforms for Systems Biology, May 2000, ERATO Kitano Systems Biology Project. Held at Caltech.

SUBMITTED PAPERS

Rao, Chickarmane, and Sauro: Conservation Analysis of Large Networks

A Computational Model of p54/Mdm2, Chickarmane, Ray and Sauro.

IN PREPARATION

"Conservation of Robustness" and Consequences for Biochemical Network Dynamics by J. Doyle, B. Ingalls, J. Goncalves, H. M. Sauro, and T.-M. Yi.

A Rationale for the Design of the MAP Kinase Pathway, H M Sauro and Brian Ingalls.

Optimization Techniques for Systems Biology (Review for Current Proteomics) Chickarmane and Sauro.

I N V I T E D T A L K S (Last Three Years in no particular order)

Institute of Systems Biology (twice)
Biocomplexity Conference (Bloomington)
University of California, San Diego
University of California, Riverside
University of California, Irvine
University of California, Santa Barbara
University of California, Merced
Laboratory of Molecular Pharmacology, National Cancer Institute, Bethesda
University of Stuttgart
University of Frankfurt
University of Oxford, England
BTK Conference
Harvard University
DARPA BioCOMP conferences: (five talks)
Thomas Jefferson Medical School
E Coli Alliance Meeting (Banff)
Caltech (Biology Department)
MRC Meeting, London
University of Alabama
Santorini Conference: Pathways, Networks, and Systems
RTK Consortium's Systems Biology of RTK Regulatory Networks Meeting, Japan
NIH SysBio SIG, Training Retreat
ICSB2001 – Introduction to Modeling
LabAutomation2005 Systems Biology
Standards and Software in Comp Bio – Mitre Organization
Beyond Genome CHI Conference
UCLA IPAM Tutorial
NIH Toxicogenomics Conference Bethesada
Pacific Northwest Laboratory
Sandia National Lab
BioTech/Pharam Rountable Panel (Boston)
PABMB: Systems Biology and Integrative Biochemistry, Argentina

W O R K S H O P S

Workshop on modeling cellular processes at University of Stellenbosch, 10-14 April 2000, see http://www.sun.ac.za/biochem/btk/workshop.html.

Second Workshop on Software Platforms for Systems Biology, May 2000, ERATO Kitano Systems Biology Project. Held at Caltech.

Third Workshop on Software Platforms for Systems Biology, June 2001, ERATO Kitano Systems Biology Project held at Caltech.

Fourth Workshop on Software Platforms for Systems Biology, November 2001, ERATO Kitano Systems Biology Project, held at Caltech.

2004 NSF funded summer workshop, Beloit, Systems Biology.

2005 NSF funded summer workshop, Howard University, Washington, Introduction to Modeling

2005 ICSB Tutorial on modeling and systems biology

2005 ICSB Workshop on Integrative Cancer Biology Program.

REFERENCES

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OTHER INTERESTS AND ACTIVITIES

Roman Archaeology
Member of the Pasadena Spelunking Society
Exploring the old mines in the San Gabriel Mountains and hiking in southwest USA.

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US Driving License