CURRICULUM VITAE INVESTIGATOR

PERSONAL DATA

Father's name **Andrews**		Name **Barbara A.**	
Birth date May 27, 1955	Age (at 15/07/2011) 55	Gender (M o F) F	Nationality(ies) Bristish
Title BSc. Biochemistry		Academic Degree Ph.D. Biochemical Engineering	
Current position Full Professor and Deputy Director of the Center for Biochemical Engineering and Biotechnology (CIByB)	Institution (Department, Faculty, Institution) University of Chile, Faculty of Physical and Mathematical Sciences, Department of Chemical Engineering and Biotechnology		
Electronic address bandrews@ing.uchile.cl	Telephone (w/codes) 56-2-9784710	Web Site www.icdb.uchile.cl	

EDUCATION, ACADEMIC AND PROFESSIONAL EXPERIENCE

University of London, U.K	BSc.	1974	Biochemistry
University of London, U.K.	Ph.D.	1985	Biochemical Engineering

Topic: Regulation of Microbial Enzyme Synthesis
Title: The Synthesis and Regulation of Lytic Enzyme Systems by *Cytophaga* sp. and *Oerskovia* sp. in Batch and Continuous Culture.

RESEARCH AND/OR PROFESSIONAL EXPERIENCE

ACADEMIC EMPLOYMENT

2007-present, Associate Research Institute for Cell Dynamics and Biotechnology: a Centre for Systems Biology. 2004 – present, Full Professor and Deputy Director of the Center for Biochemical Engineering and Biotechnology, Department of Chemical and Biotechnology Engineering, and School of Physical and Mathematical Sciences, University of Chile. 1996 – 2004, Associate Professor Department of Chemical Engineering, School of Physical and Mathematical Sciences, University of Chile. 1987 – 1994, Senior Research Associate, Biochemical Engineering Laboratory, University of Reading, England. 1982 – 1986, Research Associate, Biochemical Engineering Laboratory, Department of Chemical Engineering and Applied Chemistry, Columbia University, New York.

MAIN PUBLICATIONS IN MEDIA WITH EDITORIAL COMMITTEE

Andrews, B.A., Huang, R.-B. and Asenjo, J.A. (1995) Separation and Purification of Virus-Like Particles (VLPs) in Aqueous Two-Phase Systems. Bioseparation, **5**, 105-112.

Asenjo, J.A., Schmidt, A.S., Andersen, P.R. and Andrews, B.A. (1995) Effect of Single Nutrient Limitation on Poly-β-Hydroxybutyrate (PHB) Molecular Weight Distribution in *Alcaligenes*

eutrophus, Biotechnol. Bioeng., **46**, 497-502.

Schmidt, A.S., Andrews, B.A. and Asenjo, J.A. (1996) Correlations for the Partitioning Behaviour of Proteins in Aqueous Two-Phase Systems. Effect of Overall Protein Concentration. Biotechnol. Bioeng., **50**, 617-626.

Shene, C., Mir, N., Andrews, B.A. and Asenjo, J.A. (1996) Mathematical Modelling of the Synthesis of a Cloned Lytic β-1,3-Glucanase in *Bacillus subtilis* to be used in the Selective Permeabilization of Yeast Cells. Ann. N.Y. Acad. Sci., **782**, 334-349.

Hachem, F. and Andrews, B.A. Asenjo, J.A. (1996) Hydrophobic Partitioning of Proteins in Aqueous Two-Phase Systems. Enz. Microb. Technol., **19**, 507-517.

Andrews, B.A. and Asenjo, J.A. (1996) Protein Partitioning Equilibrium between the Aqueous PEG and Salt Phases and the Solid Protein Phase in PEG/Salt Two-Phase Systems. J. Chromatography, **685**, 15-20.

Andrews, B.A., Nielsen, S. and Asenjo, J.A. (1996) Partitioning and Purification of Monoclonal Antibodies in Aqueous Two-phase Systems. Bioseparation, **6**, 303-313.

Ferrer, p., Diers, I., Asenjo, J. And Andrews, B. (1998) Yeast Cell Permeabilizing β-1,3-Glucanases: A Tool for the Integration of Downstream Processes and Metabolic Engineering Applications to Yeast, Biotechnol. Bioeng., **58**, 321-324.

Salamanca, M., Merchuk, J., Andrews, B. and Asenjo, J., (1998) On the Kinetics of Phase Separation in Aqueous Two-Phase Systems, J. Chromatography, **711**, 319-329.

Merchuk, J., Andrews, B. and Asenjo, J., (1998) Aqueous Two-Phase Systems for Protein Separation, Studies on Phase Inversion, J. Chromatography, **711**, 285-293.

Shene, C., Andrews, B.A. and Asenjo, J.A. (1999) Fed batch fermentations of *Bacillus subtilis* ToC46 (pPFF1) for the synthesis os a recombinant Beta-1,3- Glucanase: Experimental study and modelling. Enz. Microb. Technol., **24**, 247-254.

Huenupi,E., Gomez, A., Andrews, B.A. and Asenjo, J.A. (1999) Optimization and design considerations of two-phase continuous protein separation. J. Chem.Technol. Biotechnol., **74**, 256-263.

Shene, C., Mir, N., Andrews, B.A. and Asenjo, J.A. (2000) Effect of the growth conditions on the synthesis of a recombinant β-1,4-endoglucanase in continuous and fed-batch culture. Enz. Microb. Technol., **27**, 248-253.

Taboada, M.E., Graber, T.A., Asenjo, J.A. and Andrews, B. A. (2000) Drowning-out crystallisation of sodium sulphate using aqueous two-phase systems. J. Chromatography B, **743**, 101-105.

Graber, T.A., Andrews, B. A. and Asenjo, J.A. (2000) Model for the partition of metal ions in aqueous two-phase systems. J. Chromatography B, **743**, 57-64.

Gonzalez, R., Asenjo, J.A. and Andrews, B.A. (2001) Metabolic control analysis of monoclonal antibody synthesis. Biotech. Progress, Biotechnol. Prog., **17**, 217-226

Taboada, M.E., Asenjo, J.A. and Andrews, B. A. (2001) Liquid-liquid and liquid-liquid-solid equilibrium in Na_2CO_3 – PEG – H_2O. Fluid Phase Equilibria, **180**, 273-280

Graber, T.A., Taboada, M.E., Asenjo, J.A. and Andrews, B. A. (2001) Influence of the molecular weight of the polymer on the liquid-liquid equilibrium of the poly(ethylene glycol) + $NaNO_3$ + H_2O system at 298.15K. J. Chemical and Engineering Data, **46**, 308-311

González, R., Andrews, B. A. and Asenjo, J. A. (2002) A.Kinetic Model of BiP- and PDI-Mediated Protein Folding and Assembly, J. theor. Biol., **214**, 529-537

Graber, T.A., Galleguillos, H., Asenjo, J.A. and Andrews, B. A. (2002) Refractive index, density, and viscosity in the $NaNO_3$ + H_2O + poly(ethylene)glycol system at various temperatures, J. Chemical and Engineering Data, **47**, 174-178

Salamanca, M., Barria, C., Asenjo, J.A. and Andrews, B.A. (2002) Isolation, purification and preliminary characterisation of cryophilic proteases of marine origin, Bioseparation, **10**, 237-241

Asenjo, J.A., Mistry, S.L., Andrews, B.A. and Merchuk, J. (2002) Phase Separation rates of Aqueous Two-Phase Systems: Correlation with System Properties, Biotechnol. Bioeng., **79**, 217-223.

Berrgren, K., Wolf, A., Asenjo, J.A., Andrews, B.A. and Tjerneld, F. (2002) The surface exposed amino acid residues of monomeric proteins determine the partitioning in aqueous two-phase systems, B. B. Acta, 1596, 253-268

González, R., Andrews, B. A. Molitor, J. and Asenjo, J. A. (2003) Metabolic Analysis of the Synthesis of High Levels of Intracellular Human SOD in *S. cerevisiae* rhSOD 2060 411 SGA122, Biotechnol. Bioeng., 82, 152-169.

Shene, C., Andrews, B. A. and Asenjo, J. A. (2003) Study of recombinant micro-organism populations characterized by their plasmid content, Bioprocess and Biosystems Engineering, **25**, 333-340.

Olivera-Nappa, A., Andrews, B. A. and Asenjo, J. A., (2004) A mixed mechanistic-electrostatic model to explain pH dependence of glysosyl hydrolase enzyme activity, Biotechnology and Bioengineering, **86**, 573-586.

Olivera-Nappa, A., Lagomarsino, G., Andrews, B. A. and Asenjo, J. A., (2004) Effect of Electrostatic Energy on Partitioning of Proteins in Aqueous Two-Phase Systems, J. of Chromatography, **807**, 81-86.

Asenjo, J. A. and Andrews, B. A., (2004) Is there a rational method to purify proteins? From

expert systems to proteomics, J. Molecular Recognition, **17**, 236-247.

Iribarren, O. A., Montagna, J. A., Vecchietti, A. R., Pinto, J. M., Andrews, B. A. And Asenjo, J. A., (2004) Optimal Process Synthesis for the Production of Multiple Recombinant Proteins, Biotechnology Progress, Biotechnol. Progress, **20**, 1032-1043.

Andrews, B. A.,.Schmidt, A. S. and Asenjo, J. A. (2005) Correlation for the Partition Behaviour of Proteins in Aqueous Two Phase Systems: effect of Surface Hydrophobicity and Charge, Biotechnology and Bioengineering, 90, 380-390.

Olivera-Nappa, A., Reyes, F., Garrido, M., Salazar, O., Andrews, B. A., and Asenjo, J. A. (2005) Characterization- Cloning- Recombinant Expression And Protein Engineering Of A Cryophilic Protease Of Marine Origin And Its Engineered Mutants, Febs Journal, 272, 173

Shene, C., Lucero, A., Andrews, B. A., and Asenjo, J. A. (2006) Mathematical Modeling Of Elution Curves For A Protein Mixture In Ion Exchange Chromatography And For The Optimal Selection Of Operational Conditions, Biotechnology and Bioengineering, 95 (4) 704-713

Asenjo, J.A., Ramirez, P., Rapaport, I., Aracena , J., Goles, E. and Andrews, B.A. (2007) A Discrete Mathematical Model Applied to Genetic Regulation and Metabolic Networks, J. Microbiol. Biotechnol., 17,

J. P. Acevedo, F. Reyes, L.P. Parra, O. Salazar, B.A. Andrews, J.A. Asenjo, (2008) Screening PCR mediated by CODEHOP and an improved genome walking method to obtain complete new genes of subtilisin-like serine proteases, J. Biotechnol.,.133, 277–286

J.A. Asenjo and B.A. Andrews (2008) Challenges and Trends in Bioseparations, J. Chem Tech. Biotecnol., 83,117–120

L. Parra, F. Reyes, J. P. Acevedo, O. Salazar, B. A. Andrews, J. A. Asenjo, (2008) Cloning and fusion expression of a cold-active lipase from marine Antarctic origin, Enzyme Microb Technol., 42 371–377.

Salgado, J. C., Andrews, B. A., Ortuzar, M. F., and Asenjo, J. A. (2008) Prediction of the partitioning behaviour of proteins in aqueous two-phase systems using only their amino acid composition J. Chromatography A, 1178 134–144

Sepulveda, D.E., Andrews, B.A., Asenjo, J.A. and Papoutsakis, E.T. (2008) Comparative transcriptional analysis of embryoid body versus two-dimensional differentiation of murine embryonic stem cells, Tissue Engineering, 14, 1603-1614

Hold, C., Andrews, B. A., Asenjo, J. A. (2009) A stoichiometric model of *Acidothiobacillus ferrooxidans* ATCC 23270 for metabolic flux analysis, Biotechnology and Bioengineering, 102, 1448-1459

Asenjo, J. A. and Andrews, B. A., (2009) Protein purification using chromatography: selection of type, modeling and optimization of operating conditions, J. Mol. Recognit., 22, 65-76

Okoro, C. K., Brown, R., Jones, A. l., Andrews, B. A., Asenjo, J. A., Goodfellow, M. and Bull, A. T. (2009) Diversity of culturable actinomycetes in hyper-arid soils of the Atacama Desert, Chile, Antonie van Leeuwenhoek, 95, 121-133

Gerdtzen, Z. P., Salgado, J. C., Osses, A., Asenjo, J. A., Rapaport, I. and Andrews, B. A., (2009) Modeling heterocyst pattern formation in cyanobacteria, BMC Bioinformatics, 10(Suppl 6):S16

Díaz, H., Andrews, B.A., Hayes, A., Castrillo, J., Oliver, S. and Asenjo, J.A. (2009) Global gene expression in recombinant and non-recombinant yeast Saccharomyces cerevisiae in three different metabolic states, Biotech. Advances, 27, 1092-1117

Martinez, V., Gerdtzen, Z. P., Andrews, B. A., and Asenjo, J. A., (2010) Viral vectors for the treatment of alcoholism: Use of metabolic flux analysis for cell cultivation and vector production, Metabolic Engineering, 12, 129-137

Sepulveda, D., Andrews, B. A., Papoutsakis, E. T. and Asenjo, J. A. (2010) Metabolic Flux Analysis of Embryonic Stem Cells Using Three Distinct Differentiation Protocols and Comparison to Gene Expression Patterns, Biotechnol. Prog., 26, 1222-1229

Sandoval, G., Shene, C., Andrews, B. A. and Asenjo, J. A. (2010) Extension of the selection of protein chromatography and the rate model to affinity chromatography, J. Mol. Recognit., 23, 609-617

Andrews, B. A. and Asenjo, J. A. (2010) Theoretical and experimental evaluation of hydrophobicity of proteins to predict their partitioning behaviour in aqueous two phase systems: a review, Separation Science and Technology, 45, 2165-2170

Merino, M. P., Andrews, B. A. and Asenjo, J. A. (2010) Stoichiometric Model and Metabolic Flux Analysis for Leptospirillum ferrooxidans, Biotechnology and Bioengineering, 107, 696-706

Olivera, A., Andrews, B.A. and Asenjo, J.A. (2011) Mutagenesis Objective Search and Selection Tool (MOSST): an algorithm to predict structure-function related mutations in proteins. BMC Bioinformatics, 12, 122, 1-22.

Asenjo, J. A. and Andrews, B. A. (2011) Aqueous Two-Phase Systems for Protein Separation. Journal of Chromatography A. doi.10.1016/j.chroma.2011.06.051

Rateb, M.E., Houssen, W.E., Arnold, M., Abdelrahman, M.H., Deng, H., Harrison, W.T.A., Okoro, Ch.K., Asenjo, J.A., Andrews, B.A., Ferguson, G., Bull, A.T., Goodfellow, M., Ebel, R. and Jaspars, M. (2011) Chaxamycins A-D, Bioactive Ansamycins from a Hyper-arid Desert Streptomyces sp. Journal of Natural Products, DOI:10.1021/np200320u

Contador, C. A., Andrews, B. A. Liao, J. C. and Asenjo, J: A. (2011) Identification of Transcription Factors perturbed by the Synthesis of High Levels of a Foreign Protein in Yeast Saccharomyces cerevisiae (in press)

PATENTES

US Patent:"Materials and Methods for Regulating Process Formation in Cell Culture", US 60/459,506, March 31, 2003, Inventors: Caviedes, P., Caviedes, R., Freeman, T.B., Asenjo J.A., Andrews, B.A., Sepulveda D., Arriagada, C., Rivera, J.S.

US Patent:"Protein and Nucleic Acid Sequence Encoding a Krill-Derived Cold Adapted Trypsin-Like Activity Enzyme", US 10/896,010 July 22, 2004. Inventors: Asenjo J.A., Andrews, B.A.,Reyes, F., Salamanca M., Burzio L.

US Patent:"Protein and DNA Sequence Encoding a Cold Adapted Subtilysin-like Activity" US60/954,198, August 8, 2007, Inventors: Asenjo, J.A., Andrews, B.A., Acevedo, J.P., Reyes, F., Burzio, L.

US Patent: "Protein and DNA Sequence Encoding a Cold Adapted Xylanase" US61/150,545, February 6, 2009, Inventors: Asenjo, J.A., Andrews, B.A., Acevedo, J.P., Parra, L., Burzio, L.