

CURRICULUM VITAE

Brian Patrick Mooney

DATE OF BIRTH

11th May 1969

NATIONALITY

Irish (Permanent resident status in the U.S.)

TITLE

Associate Director, Charles W. Gehrke Proteomics Center, University of Missouri-Columbia

CONTACT DETAILS

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EDUCATION

University College Dublin, Ireland

Ph.D., 1996, Botany

University College Dublin, Ireland

B.Sc. (Honors Level, 2.2), 1991, Botany

RESEARCH INTERESTS

Proteomics, protein-protein interactions, protein folding and assembly, plant biochemistry, metabolic engineering of plants.

SKILLS

Computer:

- Extensive word-processing, data management, and graphical experience in Windows 2000 and Macintosh OS9/X.
- Extensive DNA and protein/peptide analysis experience: Geneworks, DNASTAR, BLAST, PSORT, TARGETP, NNPREPREDICT, Protein Prospector, Mascot.
- Completed course in use of PowerPoint 2000.
- Working knowledge of 2D electrophoresis image analysis software, specifically Phoretix (Nonlinear Dynamics) and DeCyder (Amersham Biosciences).

Leadership and interpersonal:

- Work extremely well with others, facilitate good lab interactions.
- Provided scientific direction and trouble-shooting to other members of the lab.
- Oriented and trained new lab members in scientific and community-related matters.
- Excellent oral and written communication skills.
- Excellent time/resource-management skills.
- Ability to trouble-shoot and “think-around” problems.

Protein biochemistry, molecular biology:

- Enzyme assays – radiochemical, spectrophotometric.
- Organelle isolation and *in vitro* mitochondrial and chloroplast import.
- Standard protein biochemistry - Bradford, SDS-PAGE, Western blotting.
- Advanced protein biochemistry – FPLC (MonoQ, size-exclusion), analytical ultracentrifugation, transmission electron microscopy.
- Standard nucleic acid manipulation – cloning, PCR/RT-PCR, Northern, Southern.
- Protein expression and purification – bacterial cultures, affinity chromatography, protein-protein interactions, protein assembly.

Proteomics and mass spectrometry:

- High resolution 2D electrophoresis
- Trypsin digestion, MALDI MS, Tandem MS, LC-MS
- Image capture and image analysis
- Completed course in interpretation of tandem MS data, satellite meeting to annual meeting of the association of biomolecular resource facilities, February 2003.
- Completed Voyager Biospectrometry workstation training (MALDI-TOF instrument) at Applied Biosystems' Framingham training site, April 2003.
- Completed QSTAR operator training (Tandem MS instrument) at Applied Biosystems' Framingham training site, November 2003.
- Completed AB 4700 Proteomics Analyzer training (MALDI TOF-TOF instrument) at Applied Biosystems' Framingham training site, September 2005.
- Completed ThermoFisher LTQ Orbitrap training (high resolution, high mass accuracy iontrap FTMS) on site, June 2008.

PROFESSIONAL SOCIETIES AND AWARDS

- Twelve-year member of American Society of Plant Biologists.
- Member of the Association of Biomolecular Resource Facilities
- Utility Patent issued November 7 2000 - Randall D.D., Miernyk J.A., Mooney B.P., Johnston M.L. and Luethy M.H. U.S. Patent No. 6,143,561. DNA encoding plastid pyruvate dehydrogenase and branched chain oxoacid dehydrogenase components.
- University of Missouri System Presidential recognition of academic and public service to the University for Patent award - named one of the "Patent heroes" of the UM system.
- Utility Patent issued August 10 2004 - Randall D.D., Mooney B.P., Johnston M.L., Luethy M.H., and Miernyk J.A. U.S. Patent No. 6,773,917. Use of DNA encoding plastid pyruvate dehydrogenase and branched chain oxoacid dehydrogenase components to enhance polyhydroxyalkanoate biosynthesis in plants.

RESEARCH EXPERIENCE

Associate Director (Charles W Gehrke Proteomics Center, University of Missouri, September 2004 to present)

Duties:

- Day to day operation of the Center including staff management
- Grant writing – equipment, investigator proposal consultation
- Budget and fee structure planning

- Client education: experiment design, results interpretation, etc
- Methods development (e.g. LC-MS ; quantitative proteomics)

Protein Separation Specialist (Proteomics Center, University of Missouri-Columbia, October 2002 – September 2004)

Duties:

- High resolution 2D electrophoresis: Accept samples from clients, discuss the goal(s) of the project with them and the associate director of the Proteomics Center. Extract protein from samples using techniques developed in the Center. Conduct 2D electrophoresis, stain gels with coomassie and fluorescent dyes. Image gels and analyze them using image analysis software (Phoretix, DeCyder, Imagemaster Platinum).
- Mass Spectrometry: Excise protein spots from gels (manually or using GelPix automated spot-picker), conduct trypsin digestions, analyze peptides by MALDI MS, further analysis of peptides by Tandem MS if required.
- Teaching/advising: advised clients on experimental design and interpretation, demonstrate imaging software, and image analysis software. Advise clients on collection and interpretation of mass spectrometry data.

Research Assistant Professor (Biochemistry Department, University of Missouri, Columbia, September 2000 – present)

Duties:

- Supervise undergraduate and lab-technician research projects: advise on proper scientific method, direction of research, trouble-shoot problems, advise how to present research at lab meetings, international scientific meetings and in publications.
- Patent applications: explain detailed scientific methods to engineer plant to synthesize biodegradable plastics. Describe in detail the DNA and protein sequences of subunits of the branched-chain α -ketoacid dehydrogenase complex. Describe how to alter the targeting of these subunits from plant mitochondria to chloroplasts by attaching transit peptides at their N-terminus. Describe the pathway from precursors to biodegradable plastics and how the patentable research will fit in this pathway.
- Grant writing: Describe major goals of the project. Review background literature. Describe the research. Outline budget, timeline, personnel and facilities requirements. I am PI on a grant awarded to me by the Consortium for Plant Biotechnology Research, Inc. A previous grant (on which I was co-PI) from the University of Missouri Research Board was also awarded.
- Research: Design and conduct original research in plant protein folding and assembly, and metabolic engineering.

Current research projects:

Production of biodegradable plastics in plants. Generated constructs to alter targeting of two subunits of the branched-chain α -ketoacid dehydrogenase complex. Replaced mitochondrial targeting peptides of the E1 α and E1 β subunits with chloroplast transit peptides. Confirm plastid targeting and integration into endogenous plastid pyruvate dehydrogenase complex. Confirm enzyme activity, production of propionyl-CoA within plastids. Generate “Proof of Concept” for patent licensing.

Postdoctoral fellow (Biochemistry Department, University of Missouri, Columbia, January 1996 - July 2000. Douglas D. Randall, Jan A. Miernyk - Advisors)

Pyruvate Dehydrogenase Kinase: The contribution of histidine residues to kinase activity of *A. thaliana* pyruvate dehydrogenase kinase (PDK) was examined using the histidine-modifying reagents DEPC (diethylpyrocarbonate) and DTPD ((2,2':6',2''-terpyridine)-platinum (II) dihydrate). Pre-treatment with either reagent prior to incubation with radiolabelled ATP abolished autophosphorylation of the kinase and transphosphorylation of the E1 α subunit of PDC. These data demonstrated the importance of His residues for the activity of the kinase.

BCE2: The *A. thaliana* dihydrolipoyl acyltransferase (BCE2) subunit of the branched-chain α -ketoacid dehydrogenase complex was shown to form a core complex of 24-subunits and octagonal symmetry. The protein expressed in *Escherichia coli* was highly soluble and was purified from the soluble protein fraction of *E. coli* using a size exclusion column (Superose 6). Calibration of the Superose 6 column showed BCE2 purified as a high-molecular mass complex. Sedimentation centrifugation further showed that the complex had a molecular mass in excess of 950 kDa corresponding to a subunit stoichiometry of 24. Transmission electron microscopy allowed visualization of the BCE2 complex and clearly demonstrated the octagonal symmetry of the 24mer complex.

Plastid E2: A cDNA for the plastid isoform of dihydrolipoamide S-acetyltransferase (E2) was isolated from an *A. thaliana* cDNA library by standard cloning techniques. The cDNA and the protein it encodes were characterized in terms of its expression at the mRNA and protein level and also by examining its catalytic activity.

Ph.D. candidate (University College Dublin, Ireland, October 1991 – December 1995. Matthew A. Harmey - Advisor)

Heat shock protein70 (hsp70) was isolated from *Vicia faba* leaves using ion-exchange and ATP-affinity chromatography. The purified protein was added to *in vitro* imports into isolated mitochondria to examine its effect. The protein was also used to raise antibodies. These antibodies were used to examine the binding of hsp70 to newly synthesized precursors and to examine the intra-organellar location of hsp70 isoforms. Hsp70 was found to associate with newly translated precursors in large complexes post-translationally. A hsp70 isoform was localized to the outer membranes of bean and cauliflower mitochondria.

TEACHING/OTHER EXPERIENCE

- Botany Department University College Dublin, Ireland. Teaching assistant for Introduction to Biology, Mycology, Plant biochemistry, Plant Molecular Biology and Plant Biotechnology courses.
- Oral or Poster presentations at six ASPP meetings; at the Plant Mitochondrial meeting, International Congress of Plant Molecular Biology; at eight Annual Symposia in Current Topics in Plant Biochemistry, Physiology and Molecular Biology; at the FASEB Biochemistry Meeting; and at Molecular Biology (Life Sciences) week.
- Regular member of a faculty committee to determine procedures for hiring and promotion of “professional-track” faculty (Biochemistry Dept, UMC).
- Ad Hoc reviewer for the Journal of Biological Chemistry, Plant Physiology, Plant Science, Planta, and Tree Physiology.

PUBLICATIONS

- 12 articles, 2 book chapters, 4 published abstracts.

Perryman R., Mooney B., Lennon A., Moore A.L., and Harmey M.A. (1993) Hsp70 and import of precursor proteins into plant mitochondria. In: Plant Mitochondria, A. Brennicke and U. Kuch, eds, VCH Verlagsgesellschaft mbH, Weinheim, VCH Publishers Inc., New York, pp. 315-322.

Perryman R., Mooney B., and Harmey M.A. (1995) Identification of a 42-kDa plant mitochondrial outer membrane protein, MOM42, involved in the import of precursor proteins into plant mitochondria. Arch. Biochim. Biophys. 316: 659-664.

(1995) Hsp70 and its interaction with mitochondrial precursor proteins. National University of Ireland Ph.D. Thesis, University College Dublin, Ireland

Mooney B. and Harmey M.A. (1996) The occurrence of hsp70 in the outer membrane of plant mitochondria. Biochem. Biophys. Res. Comm. 218: 309-313.

Mooney B.P., Miernyk J.A., and Randall D.D. (1998) Nucleotide sequence of a cDNA encoding the dihydrolipoyltransferase (E2) subunit of the branched-chain α -keto acid dehydrogenase complex from *Arabidopsis thaliana* (Accession No. AF038505) (PGR 98-071). Plant Physiol. 117:331.

Mooney B.P., Miernyk J.A., and Randall D.D. (1998) Nucleotide sequence of a cDNA encoding the E1 α subunit of the branched-chain α -keto acid dehydrogenase complex from *Arabidopsis thaliana* (Accession No. AF077955) (PGR98-168). Plant Physiol. 118: 711.

Mooney B.P., Miernyk J.A., and Randall D.D. (1999) Cloning and characterization of the dihydrolipoamide S-acetyltransferase subunit of the plastid pyruvate dehydrogenase complex (E2) from *Arabidopsis*. Plant Physiol. 120(2):443-452

Mooney B.P., David N.R., Thelen J.J., Miernyk J.A., and Randall D.D. (2000) Histidine modifying agents abolish pyruvate dehydrogenase complex kinase activity. Biochem. Biophys. Res. Comm. 267:500-503

Mooney B.P., Henzl M.T., Miernyk J.A., and Randall D.D. (2000) The dihydrolipoyl acyltransferase (BCE2) subunit of the plant branched-chain α -ketoacid dehydrogenase complex forms a 24-mer core with octagonal symmetry. Prot. Sci. 9:1334-1339

Luethy, M.H., Gemel, J., Johnston, M.L., Mooney, B.P., Miernyk, J.A., Randall, D.D. (2001) Developmental expression of the mitochondrial pyruvate dehydrogenase complex in pea (*Pisum sativum* L.) seedlings. Physiologia Plantarum 112:559-566

Mooney B.P., Miernyk J.A., and Randall D.D. (2002) The complex fate of α -ketoacids. In: Annu. Rev. Plant Biol. 2002, D.P. Delmer, H.J. Bohnert, S Merchant, eds, Vol. 53: 357-375

Blanka Szurmak, Ludmila Stokovskaya, Brian P. Mooney, Douglas D. Randall, and Jan A. Miernyk (2003) Expression and assembly of *Arabidopsis thaliana* pyruvate dehydrogenase in insect cell cytoplasm. Protein expression and purification Vol 28: 357-36

Mooney B.P., and Thelen J.J. (2004) High-throughput peptide mass fingerprinting of soybean seed proteins: automated workflow and utility of UniGene expressed sequence tag databases for protein identification. Phytochemistry 65:1733-44

J Wan, M Torres, A Ganapathy, J Thelen, BB DaGue, B Mooney, D Xu, and G Stacey (2005) Proteomic analysis of soybean root hairs after infection by *Bradyrhizobium japonicum*. Mol Plant Microbe Interact 18: 458-67.

Mooney B.P., Miernyk J.A., Greenlief C.M., Thelen, J.J. (2006) Using quantitative proteomics of Arabidopsis roots and leaves to predict metabolic activity. *Physiologia Plantarum* 128: 237–250

Dudley L. McCaw, Arvan S. Chan, Andrew L. Stegner, Brian Mooney, Jeffrey N. Bryan, Susan E. Turnquist, Carolyn J. Henry, Hannah Alexander, and Stephen Alexander (2007) Proteomics of Canine Lymphoma Identifies Potential Cancer-Specific Protein Markers. *Clinical Cancer Res* 13(8):2496-2503

M.L. Katz, D.N. Sanders, B.P. Mooney, G.S. Johnson (2007) Accumulation of glial fibrillary acidic protein and histone H4 in brain storage bodies of Tibetan terriers with hereditary neuronal ceroid lipofuscinosis. *J Inherit Metab Dis* 30: 952-63

REFEREES

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