BIOGRAPHICAL SKETCH

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NAME: Hudson, André O.

eRA COMMONS USER NAME (credential, e.g., agency login): HUDSONPI

POSITION TITLE: Associate Professor of Biological Sciences

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Virginia Union University	B.S.	05/2000	Biology
Rutgers University	Ph.D.	05/2006	Biochemistry and Molecular Biology
Rutgers University	Post-doctoral Associate	5/2006-5/2008	Biochemistry and Molecular Biology

A. Personal Statement

I have the training, experience and expertise required to carry out the goals of the proposed research project. I have broad training and backgrounds in the areas of amino acid biochemistry, molecular biology and bacteriology as a part of my graduate and post-doctoral training. The proposed application centers on the genetic and structural analysis of L, L-diaminopimelate aminotransferase (DapL) an enzyme involved in protein and cell wall biosynthesis as a target for narrow-spectrum antibiotic development. This project dovetails into my laboratory with respect to ongoing projects centered on amino acid metabolism and more specifically the structure and function of aminotransferase enzymes. It should be noted that I discovered the DapL pathway described in this proposal as a post-doctoral student in the lab of Dr. Thomas Leustek at Rutgers University and have continued to work on this project as an independent researcher as a faculty member at the Rochester Institute of Technology (RIT). I have forged a fruitful collaboration with Dr. Renwick Dobson from the University of Canterbury, New Zealand an expert in structural biology to significantly add into the structural aspects of enzymes involved in amino acid metabolism.

I have extensive experience in mentoring undergraduate students with research outcomes presented in national and international conferences, and have received two awards for student mentoring and research. Most of our published articles that pertain to this project (since tenure-track appointment in 2008) have student trainees as co-authors. I have been in the forefront of recruiting and training undergraduate minority students in biomedical sciences research and working to provide mentoring, retention and advancement of minority faculty in STEM disciplines. Since 2008, I am have mentored 43 undergraduate students and have published 26 papers out of 37 with undergraduate students as co-authors.

I have contributed 41 publications in peer-reviewed journal since 2002, 29 of which were over the last five years. These publications were part of my research portfolio at RIT demonstrating that I lead a dynamic, robust and productive research group. It should be noted that all of the research that is accomplished in my lab is done with undergraduate students. Over the course my career, I have secured $1,136,605 in external funding to support my research initiatives.

In summary, I have demonstrated a record of accomplishment and productive research projects in an area of high relevance pertaining to enzymatic and structural characterization of DapL in amino acid metabolism (see publications below) as an independent researcher. My expertise, training and mentoring program, collaborations and the fact that I have shown that I can manage a federal grant (NSF-MCB-Research Initiation Grant) have prepared me well to lead the project that is proposed in this NIH R15 application.

As a research active faculty, my current position at the Rochester Institute of Technology comprises research (70%) Teaching (20%) and Service (10%).

(*Student trainees**)**

1. Cala, AR*, Nadeau, MT*, Anthony W. Weatherhead*, Staker, BL, Dobson, RCJ, Abendroth, J, Myler, PJ, Hudson, AO. (2016). The crystal structure of dihydrodipicolinate reductase at 2.3A Å from the human pathogenic bacterium *Bartonella henselae str. Houston-1*. Acta Cryst F72, 885-891.

2. Naqvi, KF*, Patin, P, Wheatley, MS*, Savka, MA, Dobson, RC, Gan, HM, Barreteau, H, Blanot, D, Mengin-Lecreulx, D and Hudson, AO. (2016). Identification and partial characterization of a novel UDP-*N*-acetylenolpyruvoylglucosamine reductase/UDP-*N*-acetylmuramate:L-alanine ligase fusion enzyme from *Verrucomicrobium spinosum* DSM 4136^T. Front. Microbiol. 7:362. doi: 10.3389/fmicb.2016.00362.

3. Triassi, AJ*, Wheatley, MS*, Savka, MA, Gan, HM, Dobson, RCJ, Hudson, AO. (2014) L,L-diaminopimelate aminotransferase (DapL): A putative target for the development of narrow –spectrum antibacterial compounds. Front. Microbiol 5:509. doi: 10.3389/fmicb.2014.00509.

4. Mckinnie, SM, Rodriquez-Lopex, EM, Vederas, JC, Crowther, JM, Suzuki, H, Dobson, RC, Leustek, T, Triassi, AJ*, Wheatley, MS*, Hudson, AO. (2014) Differential response of orthologous L,L-diaminopimelate aminotransferase (DapL) to enzyme inhibitory antibiotic lead compounds. Bioorganic and Medicinal Chemistry. 22 (1) 523-530.

B. Positions and Honors

Positions and Employment

2015-present	Associate professors, Rochester Institute of Technology, Rochester, NY.
2008-2014	Assistant Professor, Rochester Institute of Technology, Rochester, NY.
2006-2008	Post-doctoral Associate, Rutgers University, New Brunswick, NJ.
2000-2006	Graduate Student, Rutgers University, New Brunswick, NJ.

Honors and Awards

2015	College of Science Faculty Research Award (RIT)
2012	College of Science Undergraduate Faculty Mentoring Award (RIT)
2008	Vice President of Research Seed Funding Award (RIT)
2006	Compact for faculty diversity achievement award
2003-2006	NIH Pre-doctoral Fellowship (GM069264)
2000-2002	NIH training grant (GM55145)
1999	NIH MARC/AIM Scholar (Purdue University)
1998-2000	MARC U*STAR Scholar Virginia Union University (NIH) (GM08503)
1996-2000	Academic Scholarship (Virginia Union University)

Other Experience and Professional Membership

2009-present	Council on Undergraduate Research (CUR)
2009-present	The American Phyto-Pathological Society
2009-present	Genome Consortium for Active Teaching (GCAT)
2008-Present	The Great Lakes Research Consortium
2007 -present	The American Association for the Advancement of Science
2006-present	The American Society of Microbiology

2003-2008 NIH Bridges to the professoriate
2003-present The Compact for Faculty Diversity
2001-present American Society of Plant Biologists (ASPB)

C. Contribution to Science directly related to this project (student mentees in asterisks)

1. **Plants utilizes a variant of the known diaminopimelate pathways to synthesize lysine**

   As a Ph.D. student I made the observation that the genomes of plants specifically that of the model plant *Arabidopsis thaliana* did not contain the certain genes necessary to synthesize the essential amino acid lysine via the acyl-like bacterial pathways. This observation was instrumental in forging the hypothesis that although plants synthesize lysine via the diaminopimelate pathway, the pathway in plants and photosynthetic organism is different from that of bacteria. This was initially a controversial hypothesis as it was assumed that plants synthesize lysine via the *E. coli* pathway as was denoted in the literature and in the all of the major text. The publications below was the first in a series of papers that was evidence that plants may utilize a novel pathway for lysine. Lysine is an essential amino acid and cannot be synthesize by animals. The fact that companies such as; Monsanto, Cargill and others have been trying to genetically engineer high-lysine plants to supplement the deficient lysine content in plants without knowing how plants synthesize this amino acid was solidified the significance of the research.

   a. Hudson, AO, Singh BK, Leustek T and Gilvarg C (2006) An L,L- diaminopimelate aminotransferase defines a novel variant of the lysine biosynthesis pathway in plants. Plant Physiol (140) 292-301.

   b. Hudson, AO, Bless, C*. Macedo, P*. Chatterjee SP. Singh, BK. Gilvarg, C. Leustek, T. (2005). Biosynthesis of lysine in plants: evidence for a variant of the known bacterial pathways. Biochemica et Biophysica Acta. (1721) 27-36.

2. **Discovery of the novel DapL pathway in bacteria**

   Dovetailing off of the discovery of a novel pathway in plants facilitated by the discovery of DapL, I made the discovery that certain bacterial lineages anabolize lysine using the plant-like pathway. This finding was intriguing because up until this point, it was assumed that all bacteria synthesize lysine using the *E. coli*-like acyl pathways or the dehydrogenase pathway used by *Corynebacterium glutamicum*. The publications below denote the first description of the DapL pathway in bacteria.

   a. Hudson, AO, Gilvarg C and Leustek T. (2008) Biochemical and phylogenetic characterization of a novel diaminopimelate biosynthesis pathway in prokaryotes identifies a diverged form of L,L-diaminopimelate aminotransferase. Journal of Bacteriol (190) 3256-3263.

   b. McCoy A, Adams N, Hudson AO, Gilvarg C, Leustek T, Maurelli A (2006) *Chlamydia trachomatis* CT390 is a transkingdom LL-diaminopimelate aminotransferase variant of the meso-diaminopimelate/lysine biosynthetic pathway. PNAS (47) 17909-17914.

3. **dapL is an essential gene in plants and photosynthetic organism**

   I continued to work on the DapL as a faculty remember as a part of my research program at RIT. My lab was interested in elucidating the DapL pathway in Algae as we hypothesized that the enzyme would be a target for algaecide development. As such, we identified the DapL ortholog from the draft genome of the alga *Chlamydomonas reinhardtii*. As part of the same study, we showed that the dapL gene is essential for plant growth and development. The publications below denote the identification, structural characterization of the algal ortholog and the discovery that the dapL gene is essential in plants and other photosynthetic cohorts.

a. Hudson, AO, Giron, I*, Dobson, R. (2011) Crystallization and preliminary X-ray diffraction analysis of L,L-diaminopimelate aminotransferase (DapL) from *Chlamydomonas reinhardtii*. Acta Cryst (F67) 140-143.

b. Dobson, RCJ, Giron, I*, Hudson, AO (2011) L,L-Diaminopimelate Aminotransferase from *Chlamydomonas reinhardtii*: A Target for Algaecide Development. PLoS ONE 6(5): e20439. doi:10.1371/journal.pone.0020439.

4. Discovery of a novel tyrosine aminotransferase in plants

The amino acids tyrosine and phenylalanine is also of interest in my lab. The reason is that we were interested in one particular aminotransferase that we suspected was involved in the synthesis of plant secondary metabolism via the catabolism of tyrosine and phenylalanine rather than the synthesis of the amino acids. To this end, we identified and characterize the enzyme annotated by locus tag At5g36160. The data from this paper provided evidence that this enzyme was involved in the degradation of tyrosine/phenylalanine to facilitate the anabolism of compounds involved in the phenlypropanoid pathway which is primarily use for the synthesis of compounds to protect the plant from biotic and abiotic stresses. This finding was intriguing because it was argued in the literature that based on the predicted localization of the enzyme, it was probably not involved in tyrosine and phenylalanine metabolism. This manuscript has been cited in multiple studies to date and was cited in studies related to the ortholog in opium poppy regarding the synthesis of the alkaloid benzylisoquinoline, tocopherol in Arabidopsis among others. Based on this discovery, I was invited to write a chapter in the book "Amino Acid In Higher Plants" focusing on the involvement of tyrosine aminotransferase in the synthesis of plant secondary compounds.

a. Hudson, AO. (2015). Chapter 4: Tyrosine Aminotransferase. Amino Acid in Higher Plants. CAB International Publishers. 68-81 ISBN:-13: 978 1 78064 263 5.

b. Prabhu, P*, Hudson, AO. (2010) Identification and partial characterization of an L-Tyrosine aminotransferase from *Arabidopsis thaliana*. Biochemistry Research International (2010) Article ID 549572.

D. Research Support

<u>Ongoing Research Support</u>

1. National Institutes of Health

NIH AREA: L,L-diaminopimelate aminotransferase (DapL): An attractive target for the development of narrow spectrum antibiotics (09/01/16-08/31/19)

Role: PI

The overarching goal of this goal of this project is to assess the feasibility and or plausibility if an enzyme involved in lysine and peptidoglycan biosynthesis is a suitable target for antibiotic development. '

2. Bayer Corporation

L,L-diaminopimelate aminotransferase (DapL): An attractive herbicidal target (09/01/16-09/01/17)

Role: PI

The overarching goal of this goal of this project is to assess characterize diaminopimelate aminotransferase form the horseweed plant.

Previous Support

1. **National Science Foundation MCB 1120541**

Research Initiation Grant (RIG): Characterization of aminotransferase like enzymes from *Arabidopsis thaliana*. (09/01/11-08/31/14)

Role: PI

The goal of this project is to characterize a subset of aminotransferase enzymes from *A. thaliana* using bio-informatical and biochemical analyses

2. **National Science Foundation**

Major Research Instrumentation (MRI) Acquisition of a confocal microscope for BioX imaging core facilitates 09/01/11-08/31/13

Role: Co-PI

The goal of this project was to buy and set up a confocal microscope as a part of the imaging core facility at RIT.

3. **Sweetwater Energy**

Characterization of microbial growth of Sweet Water Energy sugar streams derived from pretreated plant biomass (02/01/13-08/31/15)

Role: PI

To verify the microbial growth-stimulating and product formation activity of Sweet Water Energy (SWE) sugar stream extracts, this project will evaluate properties of three sugar streams that are able to facilitate growth of microorganisms. One of the overarching goals of the project is to characterize and with the ultimate goal aim purifying the factor and characterizing