

The University Senate of Michigan Technological University

Proposal 6-12

(Voting Units: Academic)

“Proposal for a non-departmental Ph.D. Program in Biochemistry and Molecular Biology (BMB)”

Submitted by the Biochemistry and Molecular Biology Doctoral Planning Group

Contacts: P. Murthy (Chemistry), R. Wusirika (Biological Sciences), C.P. Joshi (Forestry and Environmental Sciences)

There is a growing world-wide demand for scientists and engineers with advanced training in biochemistry and molecular biology. In particular, there is a recognized need for society to understand and respond to problems associated with human health, medicine, forestry and agriculture at the biochemical and molecular levels. Powerful new research tools for understanding these complex processes, such as complete genomes (of humans, animals, crop plants and trees), multi-scale computer models, and applications of “omics” technologies including pharmacogenomics (designing specific therapies based on individual genomes) are being rapidly developed. To successfully participate in these advanced research and development endeavors students require graduate-level training in biochemistry and molecular biology. Furthermore, these research problems and the techniques used to address them are inherently interdisciplinary in nature, and therefore span traditional departmental boundaries.

Michigan Tech has a long and rich history of research in the exciting field of biochemistry and molecular biology. Recent conceptual and technological advancements have widened the scope of what is possible to study in these fields and correspondingly, many recent faculty hires in individual departments and through the Strategic Faculty Hiring Initiative have increased the ranks of those around campus (Biological Sciences, Chemistry, Forest resources and Environmental Sciences, Chemical Engineering, Biomedical Engineering, Mathematics) engaged in biomedical research, plant genomics and other health-related biochemistry and molecular biology studies. Our ability to carry out cutting edge research in these areas will strongly benefit from greater coherence and integrated graduate training. Here, we propose a new doctoral degree program in Biochemistry and Molecular Biology (BMB) which would consolidate our dispersed resources and expertise. This would provide a more appropriate degree program for some of our current and future graduate students as well as a stronger and more focused educational experience for all students involved in molecular level investigations of life processes. Items required by the University Senate for proposing new academic programs (Proposal 108.1.1) are detailed in this proposal.

This program would be categorized within the one or both of the following two CIP codes:

- 26.0210 Biochemistry/Biophysics and Molecular Biology
- 26.0299 Biochemistry, Biophysics and Molecular Biology, Other

1. General description and characteristics of the program

A growing number of faculty and graduate students at Michigan Tech are working in the area of biochemistry and molecular biology. These include members of the Departments of Chemistry, Biological Sciences, Chemical Engineering, Biomedical Engineering and the School of Forest Resources and Environmental Sciences. Active research programs, courses, and a growing number of graduate degrees based on work in this area already exist. The current initiative is to build on the established and emerging research programs by developing a new, coherent, non-departmental Ph.D. program whose primary focus is the graduate education of students in the interdisciplinary areas of biochemistry and molecular Biology (BMB).

A core group of 14 graduate faculty members will be involved in the BMB Ph.D. program (Table 1). The BMB Core Faculty are those who likely would advise Ph.D. students in the program, teach relevant lecture and laboratory courses, serve on qualifying exam committees, be elected to serve on the steering committee and otherwise perform programmatic duties of graduate faculty. Current members are from the Departments of Biological Sciences, Chemistry, and the School of Forest Resources and Environmental Sciences.

The BMB program is open to faculty and students with overlapping research and academic interests. Michigan Tech faculty with close research interests include Drs. S. Bagley (BL), M.H. Song (BL), D. Shonnard (CM), C.-A. Peng (CM), A. Minerick (CM), C. Heldt (CM), M. Frost (BE), R. Rajachar (BE) and others. We expect that some of these faculty members will be interested in participating in the BMB Ph.D. program by joining the BMB Core Faculty group and participating in associated teaching and service duties. Other faculty members advise graduate students who will benefit from the new course offerings and other educational activities resulting from this program as their research focus needs a detailed understanding of biochemistry and molecular biology.

We anticipate that a coherent program in BMB will help to attract future faculty with diverse expertise in this area into the above departments as well as other department such as the Departments of Chemical Engineering and Biomedical Engineering.

Table 1. BMB Core Faculty

Department of Biological Sciences

[Rupali Datta](#), Ph.D.

Associate Professor

Plant Biochemistry, Environmental Remediation, Plant-Microbe Interactions

Office: 530 Dow Environmental Sciences and Engineering Building

Phone: (906) 487-1783; Email: rupadatta@mtu.edu

[K. Michael Gibson](#), Ph.D., FACMG

Professor

Inherited human genetic disorders

Office: 740 Dow Environmental Sciences and Engineering Building

Phone: (906) 487-2025; Email: kmgibson@mtu.edu

[Michael Gretz](#), Ph.D.

Professor

Carbohydrate biochemistry

Office: 730 Dow Environmental Sciences and Engineering Building

Phone: (906) 487-3175; Email: mrgretz@mtu.edu

[Wan Jin Jahng](#), Ph.D.

Assistant Professor

Vision mechanism, retinal degeneration, functional proteomics

Office: 501 Dow Environmental Sciences and Engineering Building

Phone: (906) 487-2192; Email: wjahng@mtu.edu

[Ramakrishna Wusirika](#), Ph.D.

Associate Professor

Plant Molecular Biology, Comparative Genomics, Bidirectional Promoters and Transposons

Office 505 Dow Environmental Sciences and Engineering Building

Phone: (906) 487-3068; Email: wusirika@mtu.edu

[Thomas Werner](#), Ph.D.

Assistant Professor

Evolution, Genetics, Toxicology, Developmental Biology, Insect Immunology, Virology

Office 523, Dow Environmental Sciences and Engineering Building

Phone: (906) 487-1209; Email: twerner@mtu.edu

Department of Chemistry

[Tarun Dam](#), Ph.D.

Assistant Professor

Glycobiology; protein-glycan interactions in immune regulation and pathogen invasion

Office: 701C Chemical Science and Engineering Building

Phone: (906) 487-2940; Email: tkdam@mtu.edu

[Pushpalatha Murthy](#), Ph.D.

Professor

Phospholipid and Phosphoinositide metabolism and biochemistry

Office: 505 Chemical Science and Engineering Building

Phone: (906) 487-2094; Email: ppmurthy@mtu.edu

[Martin Thompson](#), Ph.D.

Associate Professor

Protein-protein interactions and design of small peptide-based inhibitors of protein-interactions

Office: 510C Chemical Science and Engineering Building

Phone: (906) 487-3522; Email: thompson@mtu.edu

[Ashutosh Tiwari](#), Ph.D.

Assistant Professor

Protein misfolding diseases' with special emphasis on neurodegenerative diseases

Office: 402B Chemical Science and Engineering Building

Phone: (906) 487-1840; Email: tiwari@mtu.edu

School of Forest Resources and Environmental Sciences

[Victor Busov](#), Ph.D.

Associate Professor

Functional genomics of woody development

Office: 185, Noblet Building, School of Forest Resources and Environmental Science

Phone: 906-487-1728; Email: vbusov@mtu.edu

[Oliver Gailing](#), Ph.D.

Assistant Professor

Ecological genetics and genomics

Office: 167, Noblet Building, School of Forest Resources and Environmental Science

Phone: (906-487-1615); Email: ogailing@mtu.edu

[Chandrashekhar Joshi](#), Ph.D.

Professor

Development of fast growing bioenergy trees for efficient cell wall deconstruction to biofuels

Office: 168 Noblet Building, School of Forest Resources and Environmental Science

Phone: 906-487-3480; Email: cpjoshi@mtu.edu

[Hairong Wei](#), Ph.D.

Assistant Professor

Plant systems biology and bioinformatics

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Phone: 906-487-1473; Email: hairong@mtu.edu

Organizational Structure and Administration

The Biochemistry Ph.D. program, as an interdisciplinary, non-department program, will be administered through the Graduate School. Participating core faculty will elect a three-member steering committee. The committee will elect a Graduate Program Director who will work closely with the Dean of the Graduate School and will be assisted by a staff member. Most biochemistry and molecular biology grants are affiliated with the Biotechnology Research Center (BRC) so the staff member of BRC, who is supported by overhead returns, will provide some assistance.

The Graduate Program Director and the Steering Committee, with the help of BMB Core faculty, will review applications, make admission decisions, determine whether or not changes to the program need to be made (e.g., changing the "approved" curriculum or adding or removing faculty from participation). The home departments of the core courses are committed to offering them on a regular basis. Students enrolled in the program will be housed within the home department of their advisors. The home departments will provide office space, computational resources, and necessary supplies and infrastructure support, and will consider the students for departmental teaching assistantships when appropriate and available. All such students will be counted as members of their home departments for the purposes of internal university accounting.

2. Rationale

The new program responds to a national and international need for more researchers to address problems in the areas of human health, disease treatment and sustainable environment at a molecular level. Advanced education in biochemistry, molecular biology and related fields is essential for creative and productive approaches to these problems. This initiative is motivated by the following:

- This program provides a mechanism for recruiting more highly qualified graduate students by providing a degree that encompasses the interdisciplinary nature of biochemical research better than existing programs within individual academic departments. Currently, students interested in BMB must apply to programs in Biological Sciences, Chemistry, or the School of Forest Resources and Environmental Studies, which have their own curriculum and culture. This new BMB program would attract additional Ph.D. students who wish to have a broader interdisciplinary academic experience focused on biochemistry and molecular biology.
- The new program builds on current strengths with a core group of 14 faculty in three different departments committed to the BMB program. The program could be offered as soon as it is approved. Several existing students are already interested in entering the program.
- Many graduate-level biochemistry and molecular biology courses are currently offered at Michigan Tech in separate departments and this program would streamline existing faculty effort by helping to identify and eliminate redundancies and increase enrollments in courses that are currently undersubscribed. New graduate courses will be added to address existing deficiencies and serve the needs of students in several disciplines. The new courses along with existing courses will be organized into a coherent program.
- The Ph.D. in BMB is attractive to students as they will have a degree in their area of interest. In addition, the area of expertise of students will be obvious to academic and private sector employers because it is not currently apparent to employers that Michigan Tech students educated in Chemistry, Biological Sciences, or Forest Resources and Environmental Studies have specialized Ph.D. – level training in biochemistry and molecular biology.
- The new program would enhance interdisciplinary research at Michigan Tech by bringing together graduate students and faculty housed in different departments who are conducting related research.
- The new BMB program will be housed in the Graduate School. It will be overseen by a Steering Committee made up of BMB Core Faculty.
- Research in biochemistry and molecular biology is well funded and the new program could help with efforts to increase external funding.

3. Discussion of related programs within the institution and at other schools

There are currently three biochemistry Ph.D. programs (The University of Michigan, Ph.D. in Biological Chemistry; Michigan State University, Ph.D. in Biochemistry and Molecular Biology; Wayne State University, Ph.D. in Biochemistry and Molecular Biology) in the State of Michigan. The character of the biochemistry degree programs vary depending on the research emphasis of the faculty. The faculty involved at Michigan Tech form a unique and broad mix involving biological chemistry, molecular and cellular biology, chemical biology, plant physiology, biomedical science and engineering, biochemical engineering, biomechanical engineering, forest molecular biology and genomic sciences. This combination of subject areas spans the major sub-disciplines of biochemistry and molecular biology. Job opportunities for Ph.D. graduates in BMB are excellent and are expected to remain so as a result of national and international priorities in medicine, health, agriculture, forestry and bioenergy fields.

4. Projected enrollment

We anticipate that 2-5 students will enter the program immediately and that within five years the program will have between 15-20 students.

5. Scheduling plans

We are aiming for implementation by Fall Semester 2012. Participating departments have committed to offer core courses on a regular basis.

6. Curriculum design

Course requirements are designed to ensure that all students have a firm understanding of the fundamentals of biochemistry and molecular biology, including the principles underlying biochemical structure, biochemical dynamics, molecular biology, genomics and biotechnology. These principles will be covered in three core courses BMB5010, BMB5020 and BMB5030. The set of core courses will be offered annually. This ensures that students will be able to complete the core courses and be prepared to take the qualifying examinations during their second year.

6.1 Required Core Courses

Three 6000-level courses (three credits each), a seminar course (BMB6040; one credit), and doctoral research (BMB6990) will form the core of the curriculum for the BMB doctoral program. The courses are BMB6010: Advanced Biochemistry, BMB6020: Advanced Molecular Biology, and BMB6030: Modern BMB techniques, descriptions in Section 7 below). These courses cover the fundamentals of biochemistry and molecular biology. The three core courses will be developed and team taught by the BMB core faculty from the departments of Biological Sciences, Chemistry, and the School of Forest Resources and Environmental Sciences. These courses will provide the necessary background in the areas of biochemistry and molecular biology including genomics and biotechnology. The Departments of Chemistry and Biological Sciences and the School of Forest Resources and Environmental Sciences have agreed to support the creation of these new courses.

In addition to the nine core course credits above, students, depending on their academic background, may be required to take additional courses to provide the breadth and depth necessary for graduate research. The necessary courses will be suggested by the student's Advisor in consultation with the Advisory Committee. The courses may be at the 3000-, 4000-, 5000- or 6000-level. A partial listing of relevant 5000-level courses is included below (7.2). Courses used to satisfy the requirements for a degree will conform to Graduate School policies regarding required grades, overall GPA, and academic level.

Students will be required to complete a seminar course (BMB6040, 1 credit). Instead of duplicating seminar courses offered by other departments, BMB6040 may include elements of graduate level seminar courses currently offered by other departments such as Biological Sciences (BL5503), Chemistry (CH5900) and the School of Forest Resources and Environmental Sciences (FW5800) and others.

Students conducting research will enroll in (BMB6990).

Students will need a total of 60 credits beyond a Bachelor degree or 30 credits beyond a Master degree, per Graduate School requirements.

6.2 Qualifying Examination

Each student must pass a written qualifying exam followed by an oral exam no later than the end of the second year of graduate study (Spring semester of second year). This examination will cover topics covered in the core courses BMB6010, BMB6020 and BMB6030. The purpose of the examination is to determine the student's mastery of

knowledge in biochemistry and molecular biology and the ability to apply this knowledge. Each examination will be written by a committee of four faculty members who have been involved in teaching BMB6010, BMB6020 and BMB6030. All students in the program will take the same qualifying exam. The committee will grade the qualifying exam and conduct the oral examination. On the basis of the student's performance, the committee will decide whether or not each student passes; a student will pass if a majority of committee members vote in the affirmative. Students who do not pass the examination will be allowed a second attempt. Failure to pass the Qualifying examination in two attempts will result in dismissal from the Ph.D. program; both attempts must be completed by the end of the second year.

6.3 Proposal defense

The student will present a proposal followed by an oral defense of the research plan to his/her Advisory Committee. The proposal should be submitted within one year of successfully completing the qualifying examinations above (6.2) and no later than the completion of the third year in the Ph.D. program. The student's advisory committee must unanimously agree that the research plan is acceptable. The oral proposal is open to the University community.

6.4 Doctoral dissertation and final oral examination

The research conducted by the student will be presented to the Advisory Committee as a written dissertation. An oral presentation of that dissertation will be made following the completion of the written work. The committee will consist of at least four members of the graduate faculty. At least one of these will be from outside the student's administrative home department or school. The dissertation is acceptable if the advisor and at least two of the remaining three members of the Advisory Committee concur on its acceptance. The oral defense is open to the University community.

7. New course descriptions

In order to meet the needs of graduate students for graduate level courses in biochemistry and molecular biology, departments periodically offered courses such as, Special topics in biochemistry and molecular biology, Protein folding, Enzymology, Bioorganic chemistry, and others. We anticipate that the following core courses, which will be offered regularly, will replace many of the previous offerings

BMB6010 Advanced Biochemistry This course will focus on the relationships between structure and function of proteins, nucleic acids lipids and carbohydrates. Specific topics include enzyme catalysis, binding and allostery, protein-protein interaction and protein-nucleic acid interaction, membrane function and signal transduction. Classic and current papers may accompany the lecture material.

Foundations in basic biochemistry and molecular biology are required for this course. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: Fall.

BMB6020 Advanced Molecular Biology This course will focus on the gene structure, gene duplication gene expression, gene regulation, DNA recombination, DNA repair and transposition. Comparison between prokaryotes and eukaryotes will be drawn. Genomics and modern biotechnology methods will be discussed. Classic and current papers may accompany the lecture material. Foundations in basic biochemistry and molecular biology are required for this course. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: Fall.

BMB6030 Modern BMB Laboratory This is an intensive laboratory course that focuses on protein chemistry, nucleic acid chemistry, genomics and biotechnology. Students will rotate between research labs of four faculty where they will gain in-depth laboratory experience in modern biochemistry and molecular biology. Credits: 3.0. Lec-Rec-Lab: (0-0-3). Semesters Offered: Spring.

BMB6990 Doctoral Research Original research that culminates in a PhD dissertation. Credits: Variable to 12.0. May be repeated; Graded Pass/fail only. Semesters offered: Fall/Spring. Restrictions: Permission of instructor required. Must be enrolled in one of the following level(s): Graduate

7.1 Courses currently offered in Biochemistry and Molecular Biology at the 5000 level

- **BL5030 - Molecular Biology** Molecular biology of gene structure, expression and regulation. Molecular techniques and their application to biotechnology and genomes are covered. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: Fall; Restrictions: Must be enrolled in one of the following Level(s): Graduate.
- **BL 5035 – Bioimaging** Current concepts in light and electron microscopy and scanning probe techniques. Theory and practice of fluorescence (including confocal and multi-photon), atomic force, scanning and transmission electron, and video microscopy as applied to biological specimens with an emphasis on sample preparation. Emphasis will be placed on application of advanced techniques. Half semester course. Credits: 2.0. Lec-Rec-Lab: (0-4-0). Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year. Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **BL 5042 - Scanning Electron Microscopy of Biological Specimens** Hands-on training in operation of the scanning electron microscope (SEM). Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Successful completion of course is prerequisite to becoming a certified SEM operator in the ACMAL. Half semester course. Credits: 2.0 Lec-Rec-Lab: (0-2-6) Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior. Pre-Requisite(s): BL 5035
- **BL 5052 - Fluorescence and Video Microscopy of Biological Sciences** Hands-on training in fluorescence microscopy and video microscopy. Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Half semester course. Credits: 2.0 Lec-Rec-Lab: (0-2-6) Semesters Offered: Spring - Offered alternate years. Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior. Pre-Requisite(s): BL 5035
- **BL 5062 - Transmission Electron Microscopy of Biological Specimens** Hands-on training in operation of the transmission electron microscope (TEM). Students prepare biological specimens of their choice for observation. Emphasis will be placed on application of advanced techniques. Successful completion of course is prerequisite to becoming a certified TEM operator in the ACMAL. Half semester course. Credits: 2.0 Lec-Rec-Lab: (0-2-6). Semesters Offered: Spring - Offered alternate years. Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior. Pre-Requisite(s): BL 5035
- **BL 5145 - Plant-Microbe Interactions** Interactions between plants and microorganisms in the environment. Topics include microbial virulence, signaling, gene expression, beneficial interactions and disease resistance in plants. Laboratory will focus on plant biochemical and microbiological methods as they relate to environmental problems. Credits: 3.0 Lec-Rec-Lab: (2-0-2) Semesters Offered: Fall Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **BL 5503 - Graduate Research Seminar** Seminar is designed to facilitate critical discussions of student research projects at various stages of their development. The presenter will provide a seminar on their project and research goals, which will establish the foundation for the discussion thereafter. Credits: 1.0; May be repeated. Lec-Rec-Lab: (0-1-0). Semesters Offered: Fall
- **CH 5110 - Pharmaceutical Chemistry: Drug Action** Focuses on structural and mechanistic approaches to pharmaceuticals and drug action. General principles of absorption, distribution, action, metabolism, and toxicity of drugs will be presented followed by action of drug classes such as antibiotics, cardiovascular, and anti-inflammatory drugs. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: Spring. Restrictions: Must be enrolled in one of the following Level(s): Graduate
- **CH 5120 - Pharmaceutical Chemistry: Drug Design** Focuses on the important concepts in the design and synthesis of drugs. Rational basis for drug design including synthetic, computational, and biochemical concepts will be discussed. Topics include structure-activity relationships, synthesis and reaction mechanism, and case studies of drugs. Credits: 3.0 Lec-Rec-Lab: (3-0-0) Semesters Offered: Fall Restrictions: Must be enrolled in one of the following Level(s): Graduate

- **CH 5210 - Analytical Separations** Covers theory and applications of modern gas chromatography, high performance liquid chromatography, and ion chromatography as well as instrumentation for these techniques. Studies trace organic analysis and environmental problems. Credits: 3.0 Lec-Rec-Lab: (3-0-0) Semesters Offered: Spring. Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **CH 5230 - Mass Spectrometry and Fluorescence** Fundamentals and applications of gas chromatography-mass spectrometry, liquid chromatography-mass spectrometry and fluorescence spectroscopy. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: On Demand Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **CH 5570 - Advanced Biophysical Chemistry** A discussion of experimental techniques and applications of physical chemistry principles to the study of the structure, dynamics, and chemical reactions of proteins, nucleic acids, and other biopolymers. Credits: 3.0. Lec-Rec-Lab: (3-0-0). Semesters Offered: On Demand. Pre-Requisite(s): CH 3520
- **FW 5070 - Developmental and Ecological Genetics** Course will provide current knowledge on signal perception, transduction and response pathways in higher eukaryotes with most examples primarily from but not limited to plants in a lecture and colloquium format. Topics will cover major developmental pathways, and molecular bases of adaptation to biotic and abiotic factors. Credits: 3.0 Lec-Rec-Lab: (1-2-0) Semesters Offered: Fall Pre-Requisite(s): BL 5030
- **FW 5076 - Molecular Techniques in Ecology** The course provides knowledge on molecular techniques used in ecology, population biology, and evolutionary studies. Credits: 3.0; Graded Pass/Fail Only Lec-Rec-Lab: (3-0-0) Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year
- **FW 5082 - Gene Expression Data Analysis** Students will learn statistical methods and skills for analyzing large-scale gene expression data resulting from high-throughput technologies, become familiar with various bioinformatics tools and resources, and develop useful working knowledge of how to analyze genetic data. Credits: 3.0 Lec-Rec-Lab: (3-0-0) Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 academic year
- **FW 5089 - Tools of Bioinformatics** Computer applications in molecular biology. Hands-on experience with using popular computer programs for DNA, RNA and protein sequence analysis, database management, data editing, assembly, and organization, multiple sequence comparisons, protein structural analysis, evolutionary relationships of genes, use of Internet for data retrieval, comparison and analysis. Credits: 4.0 Lec-Rec-Lab: (2-1-2) Semesters Offered: Fall - Offered alternate years beginning with the 2011-2012 academic year Restrictions: Must be enrolled in one of the following Level(s): Graduate
- **FW 5413 - Sustainable Biomass** Production and management systems involving biomass for bioenergy and biofuels applications in native forests and energy plantations. Emphasis on integration across systems and values in the context of environmental sustainability. Credits: 3.0 Lec-Rec-Lab: (2-1-0) Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **FW 5413 - Sustainable Biomass** Production and management systems involving biomass for bioenergy and biofuels applications in native forests and energy plantations. Emphasis on integration across systems and values in the context of environmental sustainability. Credits: 3.0 Lec-Rec-Lab: (2-1-0) Semesters Offered: Fall - Offered alternate years beginning with the 2010-2011 academic year Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
- **FW 5800 - Master's Graduate Seminar** Presentation by students of current forest resource- related problems and research. Some instruction on presentation skills. Credits: 1.0 Lec-Rec-Lab: (0-1-0) Semesters Offered: Fall, Spring Restrictions: Must be enrolled in one of the following Level(s): Graduate
- **FW 5850 - Effective Grantsmanship Workshop** Ability to write successful grant application is an important part of graduate education. Students will learn basic techniques of grant writing for federal, industrial, and international funding agencies and will submit a well-organized proposal for peer review in the class. Credits: 2.0 Lec-Rec-Lab: (1-1-0) Semesters Offered: Spring Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

7.2 Potential additional courses

New courses will be offered based on the needs of graduate students and the expertise and availability of affiliated faculty. Potential new courses include, Bioremediation; Cancer/tumor metabolism; and Metabolic impact of pollutants.

8. Library and other learning resources

The program builds on existing resources, so it is not anticipated that new library or other learning resources will be required.

9. Computing Access Fee

Initially each student will pay the Computing Access Fee appropriate to the advisor's home department. The program will revisit this issue as circumstances dictate.

10. Faculty resumes

Attached below.

11. Description of available/needed equipment

Faculty listed in Table 1 have fully functioning laboratories with the necessary equipment and computers. No new equipment is required to startup this program.

12. Program costs

No new resources are requested, and costs associated with recruiting and other program administration will be handled through the Graduate School and the departments of Biological Sciences, Chemistry, and Forest resources and environmental sciences and the BRC.

13. Space

No new space is required

14. Policies, regulations and rules
Described in Section 1 (faculty participation) and Section 6 (curriculum requirements) above.

15. Accreditation requirements

Not applicable

16. Internal status of the proposal

Approved by the Department Chairs and the Deans of the College of Sciences and Arts and the School of Forest Resources and Environmental Sciences (See attached signature sheet). Preliminary review by the Dean of the Graduate School completed. Reviews by the Provost, Dean's Council, Graduate Faculty Council, and University Senate are pending.

17. Planned implementation date

There are students currently attending Michigan Tech who are interested in the BMB PhD program so we are aiming for implementation by Fall Semester 2012.

Biographical Sketch

Victor B. Busov

Associate Professor
Michigan Technological University
School of Forest Resource Environmental Science
185 Horner Hall
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Fax:906-487-2915
Houghton, MI 49931
E-mail: vbusov@mtu.edu

Education

Oregon State University	Molecular biology	Post-doc., 2004
North Carolina State University	Genetics	Ph.D.,2001
Southern Illinois University	Forestry	M.S., 1996
Bulgarian Higher Forestry Institute	Forestry	B.S., 1990

Appointments

05/08-present	Associate Professor. Michigan Technological University. Functional genomics of adaptation and development in trees.
03/04–05/08	Assistant Professor. Michigan Technological University. Functional genomics of adaptation and development in trees.
12/01—01/04	Post-doctoral Research Associate, Oregon State University Activation tagging for gene discovery in poplar.
08/96--12/01	Graduate Research Assistant. North Carolina State University. Microarray analysis of auxin-regulated gene expression in loblolly pine.
08/94–01/96	Graduate Research Assistant, Southern Illinois University Allozyme analysis of diversity and genetic structure of black walnut in central U.S.
01/96–06/96	Intern (during M.S. work), Westvaco Corporation (now MeadWestvaco) Clonal propagation of loblolly pine and cottonwoods.
11/90–08/94	Research Associate. Bulgarian Academy of Sciences Breeding, propagation and conservation of <i>Fagus</i> species in southeastern Europe.

Selected Publications

- 1)Gou, J., Strauss, S.H., Tsai, C.J., Fang, K., Chen, Y., Jiang, X., and Busov, V.B. (2010) Gibberellins Regulate Lateral Root Formation in *Populus* through Interactions with Auxin and Other Hormones. *Plant Cell* 22:623-639.
- 2)Busov, VB, Yordanov, Y Gou, J, Meilan, R, Ma, C, Regan, S and Steven Strauss (2010) Activation tagging is an effective gene tagging system in *Populus*. *Trees Genetics and Genomes*. DOI: 10.1007/s11295-010-0317-7
- 3)Xiaoqi Cui, Tong Wang, Huann-Sheng Chen, Victor Busov and Hairong Wei (2010) TF-finder: A Software Package for Identification of Transcription Factors Involved in a Biological Process Using Microarray Data and Existing Knowledge. *Bioinformatics*. 11: 425
- 4)Katherine M. Han, Palitha Dharmawardhana, Renee' S. Arias, Cathleen Ma, Victor Busov and Steven H. Strauss. (2010) Gibberellin-associated cisgenes modify growth, stature and wood properties in *Populus*. *Plant Biotech J.* p 1–17.
- 4)Busov VB, Brunner AM, Strauss SH. 2008. Genes for control of plant stature and form. *New Phytologist* 177: 589-607.
- 5)Tuskan GA, ...Busov V et al.. 2006. The genome of black cottonwood, *Populus trichocarpa* (Torr. & Gray). *Science*. 313, 1596-1604.
- 6)Busov VB, Brunner A, Meilan R, Filichkin, S, Ganio, L, Gandhi, S, Strauss, SH. 2005. Genetic transformation: A powerful tool for dissection of adaptive traits in trees. *New Phytologist*.167: 9-18.
- 7)Brunner, AM, Busov VB, and Strauss SH. 2004. The Poplar Genome Sequence: Functional Genomics in a Keystone Plant Species. *Trends in Plant Science* 9: 49-56
- 8)Busov VB, Meilan R, Pearce DW, Ma C, Rood SB, Strauss SH. 2003. Activation tagging of a dominant gibberellin catabolism gene (*GA 2-oxidase*) from poplar that regulates tree stature. *Plant Physiology*. 132: 1283-1291.

Synergistic Activities

- 1)Member of IUFRO Working Party S3. 02-03
- 2)Member of American Society of Plant Biologist
- 3)American Association for the Advancement of Science (AAAS)
- 4)Namkoong's Family Fellowship for Academic and Teaching Excellence, 2000
- 5)North Carolina Biotechnology Consortium Travel Award, 2001.
- 6)*Ad Hoc* reviewer: NSF Multiple Directorates and Programs, USDA-NRI Competitive Grants Program.
- 7)*Ad Hoc* manuscript reviewer: *Transgenic Research, Plant Science, Tree Physiology, Plant Molecular Biology, New Phytologist*.
- 8)Invited participant in the *Populus* genome sequence annotation jamboree. Dec 6-10, 2004, Joint Genome Institute, Walnut Creek, CA

Collaborators

Allen, N., NCSU; Brunner, A.M., OR State U; Davis, J., DOE; DiFazio, S.P., DOE, ORNL; Garcia, C., NCSU; Goldfarb, B., NCSU; Johannes, E., NCSU; Kung, F., S. Illinois U.; LeBude, A., NCSU; Pearce, D., U. of Lethbridge, CAN; Pregitzer, K., MTU; Rink, G., U.S. Forest Service; Rood, S.B., U. of Lethbridge, CAN; Sambeek, J.V., U.S. Forest Service; Sederoff, R.R., NCSU; Spiker, S.L., NCSU; Strauss, S.H., Oregon State U.; Sun, Y., NCSU; Swain, S., CSIRD, Australia; Tsai, C.-J., MTU; Tschaplinski, T.J., ORNL Oakridge, TN; Tuskan, G.A., ORNL, Oakridge; Whetten, R.W., NCSU; Woeste, K.E., Purdue University

Graduate and Post-Doctoral Advisors

M.S. Advisor:	Kung, F., Southern Illinois University
Ph.D. Advisor:	Goldfarb, B., NC State University; Spiker, S.L., NC State University
Post-doctoral Advisor:	Strauss, S.H., Oregon State University

Advisor and Postgraduate-Scholar Sponsor

Hao Wei (OSU); Rewati Potkar (MTU); Zhan Ye (MTU); Trisha Colling (MTU); Chamini Geethenjalee (MTU); Shiv Thammanagowda (MTU); Fuyu Xu (Ph.D., MTU); Christine Zawaski (MTU); Elizabeth Etherington (OSU); Rama Joshi (MTU) Mahita Kadmiel (MTU); Rajinikanth Mohan (MTU)

Biographical Sketch

Tarun K. Dam
Assistant Professor

Education

University of Calcutta, Calcutta, India	Protein Biochemistry	Ph. D. 1994
Indian Institute of Science, India	Protein Biochemistry	Trainee, 1993-1995
Albert Einstein College of Medicine, NY	Protein Biophysics	Postdoc, 1996-2000

Appointments

2010- Assistant Professor, Michigan Technological University, MI
2000-2010 Instructor (Full time Faculty), Albert Einstein College of Medicine, NY

Selected publications

- 1) Dam, T. K. and Brewer, C. F., Maintenance of cell surface glycan density by lectin-glycan interactions: a homeostatic and innate immune regulatory mechanism. *Glycobiology* 20, 1061-1064 (2010). <http://glycob.oxfordjournals.org/content/20/9/1061.full.pdf+html>
- 2) Dam, T. K. and Brewer, C. F., Lectins as pattern recognition molecules: the effects of epitope density in innate immunity *Glycobiology* 20, 270-279 (2010). <http://glycob.oxfordjournals.org/cgi/content/full/20/3/270?view=long&pmid=19939826>
- 3) Dam, T. K., Gerken, T. A. and Brewer, C. F. Thermodynamics of multivalent carbohydrate-lectin cross-linking interactions: importance of entropy in the bind and jump mechanism. *Biochemistry*, 48, 3822-3827 (2009). <http://www.ncbi.nlm.nih.gov/pubmed/19292456>
- 4) Dam, T. K., Torres, M., Brewer, C. F. and Casadevall, A., Isothermal titration calorimetry reveals differential binding thermodynamics of variable region-identical antibodies differing in constant region for a univalent ligand. *J. Biol. Chem.* 283, 31366-31370 (2008). <http://www.jbc.org/content/283/46/31366.long>
- 5) Dam, T. K., and Brewer, C. F., Effects of clustered epitopes in multivalent ligand-receptor interactions. *Biochemistry*, 47, 8470-8476 (2008). <http://pubs.acs.org/doi/abs/10.1021/bi801208b>
- 6) Dam, T. K., Gerken, T. A., Cavada, B. S., Nascimento, K. S., Moura, T. R., and Brewer, C. F., Binding studies of α -GalNAc specific lectins to the α -GalNAc (Tn-antigen) form of porcine submaxillary mucin and its smaller fragments. *J. Biol. Chem.* 282, 28256-28263 (2007). <http://www.jbc.org/content/282/38/28256.long>
- 7) Dam, T. K. and Brewer, C. F. Fundamentals of lectin-carbohydrate interactions, in *Comprehensive Glycoscience*, (Kamerling, J. P., ed.), Elsevier Ltd., Vol. 3, pp. 397-452 (2007). http://www.sciencedirect.com/science?_ob=RefWorkIndexURL&_idxType=TC&_cdi=48257&_refWorkId=3687&_explode=558400008.558400010&_alpha=&_acct=C000050221&_version=1&_userid=10&md5=48905b7cd1c79579306
- 8) Dam, T. K., Gabius, H.-J., André, S., Kaltner, H., Lensch, M., and Brewer, C. F. Galectins bind to the multivalent glycoprotein asialofetuin with enhanced affinities and a gradient of decreasing binding constants. *Biochemistry*, 44, 12564-12571 (2005). <http://pubs.acs.org/doi/abs/10.1021/bi051144z>
- 9) Dam, T. K., Oscarson, S., Roy, R., Das, S. K., Page, D., Macaluso, F. and Brewer, C. F. Thermodynamic, kinetic and electron microscopy studies of concanavalin A and *Dioscorea grandiflora* lectin cross-linked with synthetic divalent carbohydrates. *J. Biol. Chem.* 280, 8640-8646 (2005). <http://www.jbc.org/content/280/10/8640.long>
- 10) Dam, T. K. and Brewer C. F. Carbohydrate-lectin cross-linking interactions: structural, thermodynamic, and biological studies. *Methods in Enzymology (Recognition of Carbohydrates in Biological Systems; Y.C. Lee & R. T. Lee, ed.)*, 362, 455-486 (2003). <http://www.ncbi.nlm.nih.gov/pubmed/12968382>
- 11) Hegde, S. S., Dam, T. K., Brewer C. F. and Blanchard, J. S. (2002), Thermodynamics of aminoglycoside and acyl-coenzyme A binding to the Salmonella enterica AAC(6')-Iy aminoglycoside N-acetyltransferase. *Biochemistry* 41, 7519-7527 (2002). <http://www.ncbi.nlm.nih.gov/pubmed/12044186>
- 12) Dam, T. K. and Brewer, C. F. Thermodynamic studies of lectin-carbohydrate interactions by isothermal titration calorimetry. *Chemical Reviews* 102, 387-429 (2002). <http://pubs.acs.org/doi/abs/10.1021/cr000401x>
- 13) Dam, T. K., Roy, R., Page, D. and Brewer, C. F. Negative cooperativity associated with binding of multivalent carbohydrates to lectins. Thermodynamic analysis of the "Multivalency Effect". *Biochemistry* 41, 1351-1358 (2002). <http://www.ncbi.nlm.nih.gov/pubmed/11802737>
- 14) Dam, T. K., Roy, R., Das, S. K., Oscarson, S. and Brewer, C. F. Binding of multivalent carbohydrates to concanavalin A and *Dioscorea grandiflora* lectin. Thermodynamic analysis of the "Multivalency Effect". *J. Biol. Chem.* 275, 14223-14230 (2000). <http://www.jbc.org/content/275/19/14223.long>
- 15) Dam, T. K., Bachhawat, K., Rani, P. G. and Suroliya, A. Garlic (*Allium sativum*) lectins bind to high mannose oligosaccharide chains. *J. Biol. Chem.* 273, 5528-5535 (1998). <http://www.jbc.org/content/273/10/5528.long>

Synergistic Activities

- 1) Received Young Scientist Award for "outstanding accomplishments and contributions in the field of microcalorimetry" given at 'Biocalorimetry 2001 Conference: Philadelphia, PA.
- 2) Developed educational materials, which have been published in several books, such as *Animal Lectins: A Functional View*, (Vasta and Ahmed ed., Taylor and Francis); *Comprehensive Glycoscience*, (Kamerling, J. P., ed., Elsevier Ltd) and *Lectins: Analytical Technologies*, (Nilsson, C., ed., Elsevier B.V. Elsevier B.V).
- 3) Reviewed manuscripts for scientific journals, namely, *The Journal of Biological Chemistry*, *Biochemistry*, *Biophysical Journal*, *Proceedings of the National Academy of Sciences*, *Biochimica et Biophysica Acta*, *Glycobiology*, *Glycoconjugate Journal*, *Journal of the American Chemical Society*, *European Journal of Biochemistry*, *Phytochemistry*, *Analytical Biochemistry*.
- 4) Published a book review in the journal *Carbohydrate Research*. 325, 233-234 (2000).
- 5) Received invitation to deliver oral presentation at national scientific meetings and universities.

Collaborators

Thomas Gerken (Case Western Reserve University, Ohio)
Arturo Casadevall, John Blanchard (Albert Einstein College of Medicine, New York)
Benildo Cavada (Federal University of Ceará, Brazil)
Marit Sletmoen (The Norwegian University of Science and Technology, Norway)
Hans-J Gabius (Ludwig-Maximilians-University, Germany)
René Roy (Université du Québec à Montréal, Canada)
Stefan Oscarson (Stockholm University, Sweden)

Membership

Society for Glycobiology
American Chemical Society
American Society for Biochemistry and Molecular Biology

Biographical Sketch

Rupali Datta
Assistant professor
Department of Biological Sciences

Education

Osmania University, India	Biology and Chemistry	B.S., 1987
University of Hyderabad, India	Life Sciences	M.S. 1989
University of Hyderabad, India,	Life Sciences	Ph.D. 1997

Appointments

2008-present	Associate Professor, Department of Biological Sciences, Michigan Technological University, Houghton, Michigan
2004-2008	Assistant Professor, Department of Earth and Environmental Sciences, University of Texas at San Antonio, San Antonio, Texas
2003-2004	Research Assistant Professor and Senior Lecturer, Earth and Environmental Science Department, University of Texas at San Antonio,
2002-2003	Post-doctoral Fellow and Lecturer-I, Earth and Environmental Science Department, University of Texas at San Antonio, San Antonio, Texas
1998-2001	Post-doctoral Associate, Plant Pathology Department, University of Florida, Gainesville, Florida
1997-1998	Visiting Research Fellow, Japanese Society for Promotion of Science Fellowship) Niigata University, Niigata, Japan

Honors

1991-96	Junior and Senior Research Fellowships from the University Grants Commission, Govt. of India
1992	American Society for Plant Physiologists (ASPP) fellowship for Plant Biochemistry course at the University of California, San Diego
1994	Young Scientist Fellowship by 16th International Union of Biochemistry and Plant Molecular Biology Congress
1996-97	Senior Research Fellowship in project funded by Department of Science and Technology (Govt. of India)
1997-98	JSPS Research Fellowship by the Japanese Society for Promotion of Science
2004	Outstanding Young Scientist Award, 2004 Association of Agricultural Scientists of Indian Origin (AASIO)
2005	University of Texas at San Antonio Faculty Research Award.
2005	Early Career Award in Research. Southern Branch of the American Society of Agronomy

Selected Research Support United States Environmental Protection Agency, 2002, \$391,473/2y (Total): Biogeochemistry of arsenic in contaminated soils of Superfund sites

National Institutes of Health

- 1) 2007, \$414,550 (Direct): Novel Remediation Methods to Lower Human Health Risk from Exposure to Arsenic-Enriched Soils
- 2) San Antonio Life Sciences Institute - REF, 2004-05, \$199,990 (Direct): A multi disciplinary approach to reduce human bioavailability and carcinogenicity of soil arsenic
- 3) Department of Housing and Urban Development - Lead Technical Studies Program, 2004 - 2006, \$372,767 (Total): A novel phytoremediation method using vetiver grass to cleanup lead-based paint-contaminated soils (Joint-PI)
- 4) Department of Defense – Small Business Innovative Research, Phase-I, 2006-2007, \$100,000 (Total): A new method to clean up chromium and metal enriched stormwater in Naval shipyards (Principal)
- 5) Department of Defense – Small Business Innovative Research, Phase-II, 2008-2010, \$750,000 (Total): A new method to clean up chromium and metal enriched stormwater in Naval shipyards (Principal)

Selected Refereed Publications (out of >160 refereed publications):

- 1) Sarkar, D. and R. Datta (2003). A modified in-vitro method to assess bioavailable arsenic in pesticide-applied soils. *Environ. Polln.* 126: 263-266.
- 2) Sarkar, D. and R. Datta (2004) Health Risk from Soil Arsenic: Does one size fit all. *Arch. Environ. Health*, 59(7): 337-341.
- 3) Datta, R. and D. Sarkar (2005) Consideration of soil properties in assessment of human health risk from exposure to arsenical pesticide appl. soils. *Integr. Env. Assess. Mgmt.* 1 (1): 55-59.
- 4) Sarkar, D., R. Datta, and S. Sharma (2005) Fate and bioavailability of arsenic in organo-arsenical pesticide applied soils. Part-I. *Incubation Study. Chemosphere*, 60: 188-195.
- 5) Sarkar D., R. Datta, S. Sharma and K. Sand (2006) Arsenic biogeochemistry and human health risk assessment in organo-arsenical pesticide applied acidic and alkaline soils - Incubation study. *Sci. Total Environ.* 372 (1): 39-48.
- 6) Makris K.C., D. Sarkar and R. Datta (2006) Evaluating a waste by-product as a novel sorbent for arsenic. *Chemosphere* 64(5): 730 – 741.
- 7) Makris K.C., S. Quazi, R. Nagar, D. Sarkar, and R. Datta and V.L. Sylvia (2008) In-vitro model improves prediction of soil arsenic bioavailability: Worst-case scenario. *Environ. Sci. Technol.* 42: 6278-6284.
- 8) Nagar R., K. Makris, D. Sarkar, R. Datta and Sylvia V (2009) Bioavailability and Bioaccessibility of arsenic in a soil amended with drinking water treatment residuals. *Arch. Environ. Contamin. Toxicol.* 57(4): 755-766.
- 9) Andra S, Datta R, Sarkar D, Bach S, Mullen C (2010) Synthesis of phytochelatin in vetiver grass upon lead exposure in the presence of phosphorus. *Plant and Soil* 326: 171-185.
- 10) Das P, Datta R, Makris K, Sarkar D (2010). Vetiver grass is capable of removing TNT from soil in the presence of urea. *Environmental Pollution* 158: 980-983.
- 11) Makris K, Sarkar D, Salazar J, Punamiya P, and Datta R (2010) Alternative amendment for soluble phosphorus removal from poultry litter. *Environ. Sci. Pollut. Res.* 17(1):195-202.
- 12) Nagar R, Sarkar D, Makris K, and Datta R (2010) Effect of solution chemistry on As sorption by Fe- & Al-based drinking-water treatment residuals. *Chemosphere*. 78(8): 1028-1035.
- 13) Andra S, Datta R, Sarkar D, Bach S, Mullen C (2010). Synthesis of phytochelatin in vetiver grass upon lead exposure in the presence of phosphorus. *Plant & Soil.* 326(1-2): 171-185.
- 14) Das, P., Datta, R., Makris, K., and Sarkar, D. (2010). Vetiver grass is capable of removing TNT from soil in the presence of urea. *Environ. Pollut.* 158(5): 980-983).
- 15) Andra S, Sarkar D, Saminathan S, and Datta R. (2010) Predicting potentially plant-available lead in contaminated residential sites. *Environ. Monitor. Assess.* DOI 10.1007/s10661-010-1559-4 (E-publication *ahead of print*).

Biographical Sketch

Oliver Gailing

Assistant Professor of Ecological Genomics
School of Forest Resources and Environmental Science
Michigan Technological University, Houghton, MI 49931
Tel: 906-487-1615, email: ogailing@mtu.edu
Web Page: <http://forest.mtu.edu/faculty/gailing/>

Professional preparation

M. Sc. (Botany), University of Bochum, Germany, 1994
Ph.D. (Genetics), University of Halle, Germany, 2000
PostDoc (Genetics), Leibniz Institute IPK-Gatersleben, Germany, 2002-2002
Post lecturer qualification (Habilitation, Forest Genetics), University of Goettingen, Germany, 2009

Appointments

2009-present Assistant Professor, Michigan Tech University

2008-2009 Research Scientist, Goettingen University, Germany
2002-2008 Assistant Professor ("Wiss. Assistent") , Goettingen University
2000-2002 Research Scientist (PostDoc), Leibniz Institute IPK-Gatersleben, Germany
1996-2000 Research Scientist (Ph.D.), Leibniz Institute IPK-Gatersleben, Germany
1994-1996 Research Scientist, Bochum University, Germany

Five recent publications most closely related to the proposed project:

Gailing, O., Vornam, B., Leinemann, L.L. & R. Finkeldey. 2009. Genetic and genomic approaches to assess adaptive genetic variation in plants: forest trees as a model. *Physiologia Plantarum* 137:509-519. doi: 10.1111/j.1399-3054.2009.01263.x.
Curtu, A. L., Gailing, O. & R. Finkeldey. 2009. Patterns of contemporary hybridization inferred from paternity analysis in a four-oak-species forest. *BMC Evolutionary Biology.* 2009, 9: 284, doi:10.1186/1471-2148-9-284.
Gailing, O., Langenfeld-Heyser, R. Polle, A. & R. Finkeldey. 2008. QTL loci affecting stomatal density and growth in a *Quercus robur* progeny: implications for the adaptation to changing environments. *Global Change Biology* 14:1934-1946. doi:10.1111/j.1365-2486.2008.01621.x
Gailing, O. 2008. QTL analysis of leaf morphological characters in a *Quercus robur* full-sib family (*Q. robur* x *Q. robur* subsp. *slavonica*). *Plant Biology* 10: 624-634. Doi: 10.1111/j.1438-8677.2008.00063.x
Curtu, A. L., Gailing, O. & R. Finkeldey. 2007. Evidence for natural hybridization within a species-rich oak (*Quercus* spp.) community. *BMC Evolutionary Biology* 7:218. Doi:10.1186/1471-21-48-7-218.

Five additional significant publications:

Durand, J., E. **Bodenes**, C., Chancerel, Frigerio, J.-M., Vendramin, G., Sebastiani, F., Buonamici, A., **Gailing, O.**, **Koelewijn**, H.P., **Villani** F., Mattioni, C., Cherubini, M., Goicoechea, P., Herran, A., Ikarán, Z., Cabane, C., Ueno, S., de Daruvar, A., **Kremer**, A. & C. **Plomion**. 2010. SSR mining in oak ESTs and bin mapping of 256 loci in a *Quercus robur* L. full-sib pedigree. *BMC Genomics* 11:570.
Gailing, O., Wachter, H., Heyder, J., Schmitt H.-P. & R. Finkeldey. 2007. Chloroplast DNA analysis in oak stands (*Quercus robur* L.) in North Rhine-Westphalia with presumably Slavonian origin: Is there an association between geographic origin and bud phenology? *Journal of Applied Botany and Food Quality* 81: 165-171.
Curtu, A.L., Gailing, O., Leinemann, L. & R. Finkeldey. 2007. Genetic variation and differentiation within a natural community of five oak species (*Quercus* spp.). *Plant Biology* 9:116-126.
Mottura, M.C, Finkeldey, R., Verga, R.A. & O. Gailing. 2005. Development and characterization of microsatellite markers for *Prosopis chilensis* and *P. flexuosa* and cross-species amplification. *Mol. Ecol. Notes* 5: 487-489.
Gailing, O., Kremer, A., Steiner, W., Hattemer, H.H. & R. Finkeldey. 2005. Results on quantitative trait loci for flushing date in oaks can be transferred to different segregating progenies. *Plant Biology* 7: 516-525.

Synergistic activities

- 1) Ad hoc reviewer for international Journals (e.g. *BMC Plant Biology*, *BMC genomics*, *Conservation Genetics*, *Molecular Ecology*, *New Phytologist*, *Plant Biology*, *Physiologia Plantarum*, *Plant Cell and Environment*, *Plant Systematics and Evolution*)
- 2) Ad hoc reviewer for Agence Nationale de la Recherche (France); ERANET, European Union's 6th Framework Program for Research
- 3) Session Chair in international conferences, (AOX symposium, 2009, Evora, Portugal, Fagaceae Genomic conference (Raleigh November 10 -13, North Carolina)
- 4) Ph.D. Committees: Klaus Richter (University Kassel, 2009), Jerome Durand (University of Bordeaux, December 2009)
- 5) Developed a new class in Ecological Genomics

Honors and Awards

1/2009: Habilitation (Post Lecturer Qualification) for Forest Genetics and Forest Tree Breeding at the Georg-August University of Göttingen
7/2000 Luther certificate of the University Halle / Wittenberg for the PhD thesis

Graduate and Postdoctoral advisors:

- Prof. Dr. Reiner Finkeldey, Prof. Dr. Konrad Bachmann, Prof. Dr. Thomas Stuetzel

Thesis Advisees:

- *PhD (co-supervisor):* **Indrioko** Sapto (2005), **Pandey** Madhav (2005), **Cao** Cuiping (2006), **Curtu** Alexandru Lucian (2006), **Mottura** Martin (2006), **Derero** Abayneh (2007), **Ayele** Bekele Taye (2008), **Akinngbe** Akindele (2008), **Nuroniah** Hani (2009), **Nguyen** Nga (2009), **Richter** Klaus (2009), **Rachmayanti** Yanti (2009)

Master (co-supervisor): **Duyen** Ngo Thi (2004), **Pandey** Madhav (2004), **Villarin** Randy (2007), **Gauli** Archana (2007), **Min** Yazar (2007), **Desta** Demissew Sertse (2008)

Bachelor (co-supervisor): **Nesemann** Kai (2004), **Hesse** Katrin (2007), **Maschek** Daniela (2007), **Gottwald** Christoph (2008), **Hinrichsen** Julia (2008), **Hess** Bastian (2008)

Biographical Sketch

Gibson, K. Michael

Professor and Chair

Department of Biological Sciences

Michigan Technological University

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Phone: (906) 487-2025

Email: kmgibson@mtu.edu

Education

University of California, Riverside, CA	Biochemistry	B.S. 1977
University of Colorado, Boulder, CO	Chemistry	M.S. 1979
University of California, San Diego, CA	Chemistry	Ph.D. 1983

Appointments, Honors, Awards

1984 - 1986 Postdoctoral Fellow, Dept. Pediatrics, University of California, San Diego, La Jolla, CA
1985 - 1986 Bank of America-Giannini Foundation Fellow
1986 - 1988 Assistant Research Biochemist, Dept. Pediatrics, Univ. of California, San Diego, La Jolla, CA
1988 - 1998 Senior Research Scientist, Institute for Metabolic Disorders, Baylor University Medical Center and Baylor Research Institute, Dallas, Texas
1991 - 1992 Alexander von Humboldt Foundation Research Fellow, Heidelberg, Germany
1989 - 1994 Assistant Professor of Biomedical Studies, Baylor University, Waco, Texas
1989 - 1995 Adjunct Assistant Professor of Biological Sciences, Southern Methodist University, Dallas, TX
1994 - 1998 Associate Professor of Biomedical Studies, Baylor University, Waco, TX
1995 - 1998 Adjunct Associate Professor of Biological Sciences, Southern Methodist University, Dallas, TX
1995 - 1998 Adjunct Associate Professor/Neurology, Univ. Texas Southwestern Medical School, Dallas, TX
1998 - 2001 Associate Professor, Depts. of Molecular and Medical Genetics and Pediatrics, Oregon Health & Science University, Portland, Oregon
1998 - 2005 Director, Biochemical Genetics Laboratory, Oregon Health & Science University, Portland, OR

1999 - 2009 Board Certified Clinical Biochemistry Technician, American College of Medical Genetics
 2001 - 2005 Professor, Dept. Molecular and Medical Genetics, Oregon Health & Science University
 2004- Komrower Memorial Lecturer, Annual Meeting, Society for Study of Inborn Errors of Metabolism, Amsterdam, August 31 - September 4, 2004
 2005- 2009 Director, Biochemical Genetics Laboratory, Children's Hospital of Pittsburgh of UPMC
 2005 - 2009 Professor, Pediatrics, Pathology, Human Genetics, University of Pittsburgh School of Medicine
 2009- Pres Professor and Chair, Biological Sciences, Michigan Technological University
 2008 NIH Site Visit, PDEGEN (Program in Developmental Endocrinology/Genetics), March 26-28.

Selected Publications (from 258)

- 1) Harding CO, **Gibson KM** (2010) Therapeutic liver repopulation for phenylketonuria. *J Inherit Metab Dis* May 22. [Epub ahead of print] PMID: 20495959
- 2) Skvorak KJ, Hager EJ, Arning E, Bottiglieri T, Paul HS, Strom SC, Homanics GE, Sun Q, Jansen EE, Jakobs C, Zinnanti WJ, **Gibson KM** (2009) Hepatocyte transplantation (HTx) corrects selected neurometabolic abnormalities in murine intermediate maple syrup urine disease (iMSUD). *Biochim Biophys Acta* 1792:1004-10. PMID: 19699299
- 3) Skvorak KJ, Paul HS, Dorko K, Marongiu F, Ellis E, Chace D, Ferguson C, **Gibson KM**, Homanics GE, Strom SC (2009) Hepatocyte transplantation improves phenotype and extends survival in a murine model of intermediate maple syrup urine disease. *Mol Ther* 17:1266-73. PMID: 19436271
- 4) Vardya I, Drasbek KR, **Gibson KM**, Jensen K (2010) Plasticity of postsynaptic, but not presynaptic, GABA(B) receptors in SSADH deficient mice. *Exp Neurol* June 4 [Epub ahead of print] PMID: 20570675
- 5) Dósa Z, Nieto-Gonzalez JL, Korshoej AR, **Gibson KM**, Jensen K (2010) Effect of gene dosage on single-cell hippocampal electrophysiology in a murine model of SSADH deficiency (gamma-hydroxybutyric aciduria). *Epilepsy Res* 90:39-46. PMID: 20363598
- 6) Acosta MT, Munasinghe J, Pearl PL, Gupta M, Finegersh A, **Gibson KM**, Theodore WH (2010) Cerebellar atrophy in human and murine succinic semialdehyde dehydrogenase deficiency. *J Child Neurol* May 5 [Epub ahead of print] PMID: 20445195
- 7) Zhang GF, Kombu RS, Kasumov T, Han Y, Sadhukhan S, Zhang J, Sayre LM, Ray D, **Gibson KM**, Anderson VA, Tochtrop GP, Brunengraber H (2009) Catabolism of 4-hydroxyacids and 4-hydroxynonenal via 4-hydroxy-4-phosphoacetyl-CoAs. *J Biol Chem* 284:33521-34. PMID: 19759021
- 8) Pearl PL, **Gibson KM**, Cortez MA, Wu Y, Carter Snead O 3rd, Knerr I, Forester K, Pettiford JM, Jakobs C, Theodore WH (2009) Succinic semialdehyde dehydrogenase deficiency: lessons from mice and men. *J Inherit Metab Dis* 32:343-52. PMID: 19172412
- 9) Pearl PL, **Gibson KM**, Quezado Z, Dustin I, Taylor J, Trzcinski S, Schreiber J, Forester K, Reeves-Tyer P, Liew C, Shamim S, Herscovitch P, Carson R, Butman J, Jakobs C, Theodore W (2009) Decreased GABA-A binding on FMZ-PET in succinic semialdehyde dehydrogenase deficiency. *Neurology* 73:423-9. PMID: 19667317
- 10) Nylen K, Velazquez JL, Sayed V, **Gibson KM**, Burnham WM, Snead OC 3rd (2009) The effects of a ketogenic diet on ATP concentrations and the number of hippocampal mitochondria in Aldh5a1(-/-) mice. *Biochim Biophys Acta* 1790:208-12. PMID: 19168117
- 11) Jansen EE, Struys E, Jakobs C, Hager E, Snead OC, **Gibson KM** (2008) Neurotransmitter alterations in embryonic succinate semialdehyde dehydrogenase (SSADH) deficiency suggest a heightened excitatory state during development. *BMC Dev Biol* 8:112. PMID: 19040727
- 12) Drasbek KR, Vardya I, Delenclos M, **Gibson KM**, Jensen K (2008) SSADH deficiency leads to elevated extracellular GABA levels and increased GABAergic neurotransmission in the mouse cerebral cortex. *J Inherit Metab Dis* 31:662-8. PMID: 18696252
- 13) Stewart LS, Nylen KJ, Persinger MA, Cortez MA, **Gibson KM**, Snead OC 3rd (2008) Circadian distribution of generalized tonic-clonic seizures associated with murine succinic semialdehyde dehydrogenase deficiency, a disorder of GABA metabolism. *Epilepsy Behav* 13:290-4. PMID: 18514581
- Nylen K, Velazquez JL, Likhodii SS, Cortez MA, Shen L, Leshchenko Y, Adeli K, **Gibson KM**, Burnham WM, Snead OC 3rd (2008) 14) A ketogenic diet rescues the murine succinic semialdehyde dehydrogenase deficient phenotype. *Exp Neurol* 210:449-57. PMID: 18199435
- 15) Hager EJ, Tse HM, Piganelli JD, Gupta M, Baetscher M, Tse TE, Pappu AS, Steiner RD, Hoffmann GF, **Gibson KM** (2007) Deletion of a single mevalonate kinase (Mvk) allele yields a murine model of hyper-IgD syndrome. *J Inherit Metab Dis* 30: 888-95. PMID: 18008182

Biographical Sketch

Michael R. Gretz

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 Michigan Technological University
 Houghton, MI 49931-1295
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 Email: mrgretz@mtu.edu
 www.desmids.mtu.edu

A. Professional Preparation:

Ph.D. 1981, Arizona State University; Botany (Plant Biochemistry)
 B.Sc., 1977, Central Michigan University; Chemistry & Biology

B. Appointments:

2010-present: Director, Biotechnology Research Center, Michigan Technological University
 2007-2008: Visiting Scholar, Scripps Institution of Oceanography, UCSD
 1999-present: Professor of Biological Sciences, Michigan Technological University
 1993-1999: Associate Professor of Biological Sciences, MTU
 1992-1993: Associate Professor of Biology (Tenured), George Mason University
 1989-1992: Director, Shared Research Instrumentation Facility, GMU
 1988-1989: Co-Director, Center for Basic and Applied Research, GMU
 1986-1991: Assistant Professor of Biology, GMU
 1984-1986: Postdoctoral Research Assoc., Univ. of Texas, Austin with R. Malcolm Brown
 1981-1984: Postdoctoral Research Fellow, McMaster University with E. L. McCandless

C. Publications:

FIVE SELECTED PUBLICATIONS RELATED TO PROPOSED PROJECT:

Bellinger, B.J., Gretz, M.R., Domozych, D, Kiemle, S and Hagerthy, S. 2010. The composition of extracellular polymeric substances from periphyton assemblages in the Florida Everglades. *Journal of Phycology* 46:674-678.
 Bellinger, B.J., Underwood, G.J.C., Ziegler, S.E. and Gretz, M.R. 2009. The significance of diatom-derived polymers in carbon flow dynamics within estuarine biofilms determined through isotopic enrichment. *Aquatic Microbial Ecology* 55:169-187.
 Domozych, D.S., Elliot, L, Kiemle, S.N. and Gretz, M.R. 2007. Pleurotaenium trabecula, a desmid of wetland biofilms: The extracellular matrix and adhesion mechanisms. *Journal of Phycology* 43:1022-1038.

Hanlon, A.R.M., Bellinger, B.J., Xiao, G., Haynes, K, Ball, A.S., Osborn, M, Gretz, M.R., and Underwood, G.J.C. 2006. Dynamics of EPS production and loss in an estuarine, diatom-dominated microalgal biofilm over a tidal emersion-immersion period. *Limnology & Oceanography* 51:79-93.

Bellinger, B.J., Abdullahi, A.S., Gretz, M.R. and Underwood, G.J.C. 2005. Biofilm Polymers: Relationship between carbohydrate biopolymers from estuarine mudflats and unialgal cultures of benthic diatoms. *Aquatic Microbial Ecology*. 38:169-180.

OTHER PUBLICATIONS (last five years):

Domozych, D.S., Lambiasse, L., Kiemle, S.N. and Gretz, M.R. 2009. Structure and biochemistry of charophycean cell walls. II. Cell wall development and bipolar growth in the desmid *Penium margaritaceum*. Asymmetry in a symmetric world. *Journal of Phycology* 45:894-897.

Domozych, D.S., Serfis, A., Kiemle, S. and Gretz, M.R. 2007. The structure and biochemistry of charophycean cell walls. I. Pectins of *Penium margaritaceum*. *Protoplasma* 230:99-115.

Kiemle, S.N., Domozych, D.S. and Gretz, M.R. 2007. The exopolymers of desmids: Chemistry, structural analysis and implications in wetland biofilms. *Phycologia* 46:617-627.

Apoya, M.D., Yin, L., Underwood, G.J.C. and Gretz, M.R. 2006. Movement modalities and responses to environmental changes of the mudflat diatom *Cylindrotheca closterium*. *Journal of Phycology* 42:379-390.

Abdullahi, A.S., Underwood, G.J.C., and Gretz, M.R. 2006. Extracellular matrix assembly in diatoms (Bacillariophyceae). V. Environmental effects on polysaccharide synthesis in the model diatom *Phaeodactylum tricornutum*. *Journal of Phycology* 42:363-378.

D. Synergistic Activities:

Elected Treasurer, Phycological Society of America 2004-2006
AAAS Section G Committee representative 2006-2008
Organized NSF funded "Modern Methods" workshop at International Botanical Society meeting 2002

Patents:

Magnetic alteration of cellulose during its biosynthesis (with R. M. Brown, Jr. and D. B. Folsom). United States Patent No. 4,891,317, January 1990. Foreign counterparts

E. Collaborators (last 48 mo.):

Ziegler, Sue. Memorial University of Newfoundland, Canada
Liepman, Aaron. Eastern Michigan University
Hildebrand, Mark. Scripps Institution of Oceanography
Roberts, Alison, University of Rhode Island
Delwiche, Chuck, University of Maryland
Domozych, David. Skidmore College
Willats, William, University of Copenhagen
Hagerthey, Scot. South Florida Water Management District
Hotchkiss, Arland. USDA ERRC Wyndmoor
Pauly, Markus, Michigan State University. – DOE Lab
Spaulding, Sarah. EPA, Colorado
Underwood, Graham. University of Essex, UK
Handler, Robert. Michigan Technological University

Graduate and Post-doctoral Advisors of M. Gretz:

Aronson, Jerome. Arizona State University
Sommerfeld, Milton. Arizona State University
Brown, R. Malcolm, Jr. University of Texas, Austin
McCandless, Esther. McMaster University, Ontario, Canada

Graduate Students:

Erin McKenney, M.S. expected 2012.
Sarah Kiemle, Ph.D. 2010.
Melba Apoya, Ph.D. 2006.
Brent Bellinger, Ph.D. 2006.
Abass Abdullahi, Ph.D. 2006.
Yan Wang, Ph.D. 2000
Jingjie Lu, Ph.D. 1999
Brandon Wustman, Ph.D. 1998
Yalin Wu, Ph.D. 1993
Carla Kinslow, M.S. 1999

Postdoctoral Fellows Hosted:

Sarah Kiemle, 2010-11, MTU
Utpal Adhikari, 2009-10, University of Burdwan, India
Ash Haeger, 2008-10, University of Leeds, UK
Eric Koh, 1998-99, University of Otago, NZ
Jean-Claude Mollet, 1993-95, UC Riverside

Biographical Sketch

Wan Jin Jahng

Assistant Professor
Department of Biological Sciences
Michigan Technological University
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Email: wjahng@mtu.edu

Education

Korea University, Seoul, Korea	Agricultural Chemistry	B.S. 1986-1990
Korea University, Seoul, Korea	Organic Chemistry	M.S. 1990-1992
University of Nebraska, Lincoln, NE	Organic Chemistry	Ph.D. 1995-2000
Harvard Medical School, Boston, MA	Biochemistry, Proteomics	Postdoc 2001-2003
Harvard Medical School, Boston, MA	Biochemistry, Proteomics	Research Associate 2004-2005

Appointments

Professional Experience

2009-present Assistant Professor, Department of Biological Sciences, Michigan Technological University

2006-2009 Assistant Professor, Department of Ophthalmology, Adjunct Assistant Professor, Department of Pathology, Microbiology, and Immunology, School of Medicine, University of South Carolina
 2001-2005 Research Fellow, Research Associate, Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School
 1995-2000 Research and teaching assistant, Department of Chemistry, University of Nebraska-Lincoln
 1994 Instructor, Department of Chemistry, Korea University
 1990-1992 Research and teaching assistant, Department of Chemistry, Korea University
 2010- Institutional Animal Care and Use Committee, Michigan Technological University
 2009- Graduate Committee, Biology Department, Michigan Technological University
 2007-9 Proteomics Committee, University of South Carolina
 2007- Scientific Advisory Board, Center for Molecular Dynamics-Nepal (Nonprofit NGO)
 2006- Principal Organizer, Nepal Trauma Center Project
 2003 Symposium Organization: Principal Organizer, U.S.-Korea Bioscience-Biotechnology Conference
 2003 President, New England Bioscience Society (NEBS)
 2003- Member, Association for Research in Vision and Ophthalmology (ARVO)
 2001 Editor-in-Chief, New England Bioscience Society (NEBS)
 1998 Nebraska Chapter President, Korean-American Scientists and Engineers Association (KSEA)
 1996- Member, American Chemical Society (ACS)
 1992-4 Republic of Korea Navy
 1992- Life member, Korean Chemical Society (KCS)

Honors

2010 Research Excellent Fund, Michigan Technological University, MI
 2007 New Investigator Award, International Foundation, Korea
 2003 Appreciation Award for the service of the 20th President, New England Bioscience Society, Boston, MA
 2001 Appreciation Award for Annual Conference Editor-in-Chief. New England Bioscience Society, Boston, MA
 2000 Outstanding Research Award. Department of Chemistry, University of Nebraska-Lincoln
 1999 Outstanding Teaching Award. Department of Chemistry, University of Nebraska-Lincoln
 1997 Distinguished Teaching Award. College of Arts and Sciences, University of Nebraska-Lincoln
 1992 Seok Lim Korea University Alumni Faculty Scholarship, Graduate School, Korea University

Publications

Five related

- 1) Lee, H., Chung, H., Hunt, R.C., Lamoke, F., Arnouk, H., Wood, P.A., Hrushesky, W. J. M. and Jahng, W. J. (2010) Cleavage of the retinal pigment epithelium-specific protein RPE65 under oxidative stress, International Journal of Biological Macromolecules, in press.
 - 2) Zhang, Z., Hrushesky, W. J. M., Wood, P.A., Hunt, R. C., and Jahng, W. J. (2010) Melatonin reprogrammes proteomic profile in light-exposed retina in vivo, International Journal of Biological Macromolecules, in press.
 - 3) Chung, H., Lee, H., Lamoke, F., Hrushesky, W. J. M. Wood, P. A., and Jahng, W. J. (2009) Neuroprotective Role of Erythropoietin by Anti-apoptosis in the Retina, Journal of Neuroscience Research, 87, 2365-2374.
 - 4) Xue, L., Jahng, W. J., Gollapalli, D., Rando, R. R. (2006) The Palmitoyl Transferase Activity of Lecithin Retinol Acyltransferase, Biochemistry 45, 10716-10718.
 - 5) Xue, L., Gollapalli, D., Maiti, P., Jahng, W. J., and Rando, R. R. (2004) A Palmitoylation Switch Mechanism in the Regulation of the Visual Cycle, Cell 117, 761-771.
- Five others:
- 6) Hamirally, S., Kamil, J. P., Ndassa-Colday, Y. M., Lin, A. J., Jahng, W. J., Baek, M. C., Noton, S., Simpson-Holley, M., Knipe, D. M., Golan, D. E., Marto, J. A., and Coen, D. M. (2009) Viral Mimicry of Cdc2/Cyclin-Dependent Kinase 1 Mediates Disruption of Nuclear Lamina During Human Cytomegalovirus Nuclear Egress, PLoS Pathogens, 2009 Jan; 5(1): e1000275 Epub 2009 Jan 23.
 - 7) Karukurichi, K. R., de la Salud-Bea, R., Jahng, W. J., Berkowitz, D. B. (2007) Examination of the New \square -(2' Z-Fluoro)vinyl Trigger with Lysine Decarboxylase : The Absolute Stereochemistry Dictates the Reaction Course, Journal of the American Chemical Society 129, 258-259.
 - 8) Kim, J., Jahng, W. J., Vizio, D. D., Lee, J., Rubin, M. A., Shisheva, A., and Freeman, M. R. (2007) The Phosphoinositide Kinase PIKfyve Mediates EGF Receptor Trafficking to the Nucleus, Cancer Research 67, 9229-9237.
 - 9) Berkowitz, D. B., de la Salud-Bea, R., Jahng, W. J. (2004) Synthesis of Quaternary Amino Acids Bearing a (2'Z)-Fluorovinyl alpha-Branch: Potential PLP Enzyme Inactivators. Organic Letters 6, 1821-1824.
 - 10) Furukawa, N., Ongusaha, P., Jahng, W. J., Choi, C. -S., Kim, H.-J., Araki, K., Lee, Y. H. Kaibuchi, K., Kahn, B. B., Masuzaki, H., Kim, J. K., Lee, S. W., Kim, Y.-B. (2005) Role of Rho-kinase in Regulation of Insulin Action and Glucose Homeostasis, Cell Metabolism, 2, 119-129.

Synergistic Activities

- 1) 2007 Development of new teaching course: Systems biology, functional proteomics (2008 Spring semester), USC
- 2) 2007-9 Proteomics Center Committee member, Development of Differential 2D Electrophoresis, USC
- 3) 2006- Principal Organizer, Nepal Trauma Center Project
- 4) 2006 Director, Science Summer Camp for middle and high school students in South Carolina
- 5) 2003 Principal Organizer, U.S.-Korea Bioscience-Biotechnology Conference, Harvard Medical School

Selected Collaborators & Other Affiliations

Dr. Heywon Chung, Department of Ophthalmology, Asan Medical Center, Seoul, Korea. Project: Retina Degeneration-Apoptosis
 Prof. Donald M. Coen, Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School, Boston, MA 02115. Project: Human Cytomegalovirus Phosphorylation Signal Transduction

Graduate Advisors and Postdoctoral Mentor

M.S.: Prof. Bong Rae Cho, Department of Chemistry, Korea University, Seoul, Korea
 Ph.D.: Prof. David B. Berkowitz, Department of Chemistry, University of Nebraska, Lincoln, NE
 Postdoc.: Prof. Robert R. Rando, Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School

Biographical Sketch

Chandrashekhar P. Joshi

Professor of Plant Molecular Genetics
 Biotechnology Research Center
 School of Forest Resources and Environmental Science
 Michigan Technological University, Houghton, MI 49931
 Tel: 906-487-3480 Fax: 906-487-2915
 email: cpjoshi@mtu.edu
 Web page: <http://forest.mtu.edu/faculty/joshi/>

Current Research Interests:

Biotechnological improvement of lignocellulosic materials in poplars for better bioenergy production

Education

Ph.D. University of Poona, India	Biochemistry	1982
M.Sc. University of Poona, India	Botany	1977
B.Sc. University of Poona, India	Botany	1975

Appointments:

2010-present	WCU Visiting Professor, Chonnam National University, Gwangju, S. Korea
2008-present	Professor, Michigan Tech University, Houghton, MI
2007-2009	Director, Biotechnology Research Center, Michigan Tech University
2004-2009	Director, SFRES graduate programs, Michigan Tech University
2004-2008	Associate Professor, Michigan Tech University, Houghton
1999-2004	Assistant Professor, Michigan Tech University, Houghton
1996-1999	Research Assistant Professor, Michigan Tech University, Houghton
1990-1996	Research Scientist, Texas Tech University, Lubbock
1988-1990	Research Associate, Ohio State University, Columbus
1985-1988	Scientist, National Chemical Laboratory, Pune, India
1983-1985	Visiting Scientist, Max Planck Institute, Cologne, Germany
1980-1983	Scientist, National Chemical Laboratory, Pune, India
1979-1980	Research Student, National Chemical Laboratory, Pune, India
1977-1979	Lecturer in Botany, S.P. College, Pune, India

Some selected recent and significant publications:

- 1) Zhu X, Pattathil S, Mazumdar K, Brehm A, Hahn MG, Dinesh-Kumar, SP and **Joshi CP**: VIGS offers a functional genomics platform for studying plant cell wall formation. **Molecular Plant** 3: 818-833, 2010.
- 2) M. Kumar, S. Thammannagowda, V. Bulone, V. Chiang, K-H Han, **C.P. Joshi**, S. D. Mansfield, E. Mellerowicz, B. Sundberg, T. Teeri, and B. E. Ellis: An update on the nomenclature for the cellulose synthases genes from *Populus*. **Trends in Plant Science** 14: 248-254, 2009.
- 3) **C. P. Joshi**, Brunner A, Busov V, Meilan R, Thammannagowda S, and Tsai C.: Poplars. In: The Transgenics: Compendium of transgenic crop plants: Transgenic forest tree species. C. Kole and T. Hall (eds). Blackwell Publishing, Oxford, UK. PP. 1-34, 2008
- 4) **C.P. Joshi** and S.D. Mansfield: The cellulose paradox: simple molecule, complex biosynthesis. **Current Opinion in Plant Biology** 10: 220-226, 2007.
- 5) **C. P. Joshi**: Genomics of Wood development. In Aluizio Borém (Ed) Forest Biotechnology. Universidade Vicosa, Brazil, PP 273-295, 2007
- 6) Tuskan GA, ... **Joshi C**, et al The genome of black cottonwood, *Populus trichocarpa* (Torr. & Gray). **Science** 313: 1596–1604, 2006.
- 7) Suchita Bhandari, Takeshi Fujino, Shiv Thammannagowda, Dongyan Zhang, Fuyu Xu, and **C. P. Joshi**: Coordinate expression of tension stress-responsive and secondary cell wall-associated KORRIGAN endoglucanase and three cellulose synthase genes in aspen trees. **Planta** 224: 828-837, 2006.
- 8) **Chandrashekar P. Joshi**, S. Bhandari, P. Ranjan, U. C. Kalluri, X. Liang, T. Fujino, and A. Samuga: Genomics of cellulose biosynthesis in poplars. **New Phytologist** 164: 53-61, 2004
- 9) L. Wu, **C.P. Joshi**, and V.L. Chiang: A xylem-specific cellulose synthase gene from aspen (*Populus tremuloides*) is responsive to mechanical stress. **Plant Journal** 22(6): 495-502, 2000
- 10) K. Osakabe, C-C. Tsao, L. Li, J. L. Popko, T. Umezawa, D. T. Carraway, R. H. Smeltzer, **C. P. Joshi**, V. L. Chiang: Coniferyl aldehyde 5-hydroxylation and methylation direct syringyl lignin biosynthesis in angiosperms. **Proceedings of National Academy of Sciences, USA**, 96 (16): 8955-8960, 1999.

Synergistic activities

- 1) Spearheaded establishment of M. S. and PhD degrees in Forest Molecular Genetics at Michigan Tech
- 2) Currently editing two books on poplar genomics and bioenergy; author of three approved US patents
- 3) Director of Biotechnology Research Center 2007-2009, MTU
- 4) Current member of Research Advisory Council and Chair of the Institutional Biosafety Committee, MTU
- 5) Graduate Program Director, 2004-2009, SFRES, MTU
- 6) Faculty judge: Western Upper Peninsula Science Fair (Grades 4-9) and Graduate Poster competitions
- 7) Ad hoc reviewer for numerous International journals and NSF, USDA and DOE proposals;
- 8) Panel service: NSF (2005, 2006 & 2007); DOE (2006), USDA-NRI (2008)
- 9) Distinguished Teaching Award Finalist, Assistant Professor Category, MTU, 2004; fellow of SFI, 2010
- 10) PI on a successful US Department of Education grant for establishing transatlantic dual degree program in Forest Resources and Biotechnology
- 11) PI or Co-PI on over \$6 million grants from national and international agencies at Michigan Tech

Collaborators

Coauthors and Collaborators (Last 48 months)(Our Science 2006 paper has over 100 coauthors)

Arioli Tony, Bhandari Suchita, Chiang Vincent, Crasta Oswald, Davis Mark, Festucci-Buselli R, Fei Z, Fujino Takeshi, Haigler Candace, Harding Scott, Jiang Y, Kalluri Udaya, Li Laigeng, Liang Xiaoe, Liu, Yunxia, Lu, S, Mansfield Shawn, Otoni W, Podila Gopi, Ranjan Priya, Samuga Anita, Tsai Chung-Jui, Thammannagowda Shiv, Turner Simon, Williamson R, Xu Fuyu, Yi, X, Zhang Dongyan

Graduate and Postdoctoral Advisors

Dr. P.K. Ranjekar, Late Prof. Otto Schieder, Prof. Desh Pal Verma, Prof. Henry Nguyen
Thesis and Postdoc Advisees

PhD: Chen-Chung Tsao (1998), Udaya Kalluri (2003), Anita Samuga (2003), Priya Ranjan (2005), Shivegowda Thammannagowda (2007), Fuyu Xu (2009)

MS: Zihao Wang (2003), Siau Voo (2006), Asha Lakkavaram (2006), Rajesh Chavli (2000), John Saida (2008), Jake Ladd (2010), Aparupa Sengupta (2009)
Postdocs and other staff: Xiaoe Liang, Shanfa Lu, Yihua Zhou, Takeshi Fujino, Suchita Bhandari, Dongyan Zhang, Yunxia Liu, Ramesh Thakur, Xiaohong Zhu

Undergraduate Research Advisors

Marie Wilkening, Hwee Chi Tay, James Wee, Katherine Kieckhafer, Laura Kluskens, Katie Kruger, Ellen Brenna, Ashley Sharp, Megan McQuillan, Jill Recla, Kristina Flesher, Eric Koronka, Ayushi Kawatra, Ian Bonner, Sandra Orlowski, Nathan Fettingner, Eric Hollender, Justeen Beaune, and Josh Papacek

Biographical Sketch

Pushpalatha P. N. Murthy

Professor
Department of Chemistry
Michigan Technological University
Houghton, MI-49931
Tel: 906-487-2094; Fax:906-487-2061
E-mail: ppmurthy@mtu.edu

Education

Miranda House, Delhi University, Delhi, India	Chemistry	B.Sc. (Hons) 1972
Indian Institute of Technology, Kanpur, India	Chemistry	M.Sc. 1974
Brown University, Providence, RI	Bioorganic Chemistry	Ph.D. 1979
The Univ. of Mich., Ann Arbor, MI	Bioorganic Chemistry	1979-1980
The Univ of Michigan, Ann Arbor, MI	Neuroscience	1980-1982

Appointments

Sept.99 - present:	Professor, Dept. of Chemistry, Michigan Technological University, Houghton, MI
Feb. 06 - May 06:	Sabbatical leave at CSIRO Canberra, and CAMBIA, Canberra, Australia
Aug. 01 - July 04:	Chair, Dept. of Chemistry, Michigan Technological University, Houghton

Aug. 00 - Aug.01: Interim Chair, Dept. of Chemistry, Michigan Tech. University, Houghton, MI
Sep. 91 - Aug. 99: Associate Professor, Dept. of Chemistry, Michigan Tech. Univ., Houghton, MI
Mar. 93 - May 93: Visiting Assoc. Prof (on sabbatical leave), Biotechnology Dept., Cornell University, Ithaca, NY
Sep. 92 - Dec. 92: Visiting Assoc. Prof (on sabbatical leave), Michigan State University, East Lansing, MI
Sept. 86 - Aug. 91 Assistant Professor, Department of Chemistry, Michigan Technological University, Houghton, MI
Sept. 85 - Aug. 86 Visiting Asst. Professor, Department of Chemistry and Chemical Engineering, Michigan Technological University, Houghton, MI
Aug. 82 - Jan. 85: Research Chemist, Stauffer Chemical Company, Dobbs Ferry, NY.

Selected Publications

- 1) S.C. Johnson, M. Yang, P.P.N. Murthy (2010) Heterologous expression and functional characterization of a plant alkaline phytase in *Pichia pastoris*. *Protein Express. Purif.* 74, 196-203.
- 2) C. Xue, S. Velayudhan, S. C. Johnson, R. Saha, A. Smith[#], W. Brewer, P.P.N. Murthy, ST. Bagley, Haiying Liu (2009) Highly water-soluble, fluorescent, conjugated fluorine-based glycopolymers with poly(ethylene glycol)-tethered spacers for sensitive detection of *Escherichia coli*. *Chem. Eur. J.* 15, 2289-2295.
- 3) Pushpalatha P.N. Murthy (2007) Identification of inositol phosphates by NMR spectroscopy: unraveling structural diversity. In Proceedings of the Bouyoucos conference on Biogeochemical interaction of inositol phosphates in the environment, B.L. Turner, A.E. Richardson, and E.J. Mullaney (Editors), CB international, Cambridge, MA, pp 7-22
- 4) Ping Yang, Bernard Spiess, Pushpalatha P.N. Murthy, Richard E. Brown (2007) Influence of metal cations on the intramolecular hydrogen-bonding network in phosphorylated compounds. *J. Phys. Chem.* 111, 3602-3612
- 5) Cuihua Xue, Sonali P. Jog, Pushpalatha P. N. Murthy, and Haiying Liu (2006) Synthesis of highly water-soluble fluorescent conjugated glycopoly(p-phenylene)s for lectin and *Escherichia coli*. *Biomacromolecules*, 7, 2470-2474
- 6) Bakul Dhagat Mehta, Sonali P. Jog, Steven C. Johnson and Pushpalatha P.N. Murthy (2006) Lily pollen alkaline phytase is a histidine phosphatase similar to mammalian multiple inositol polyphosphate phosphatase (MINPP). *Phytochemistry*, 67, 1874-1886.
- 7) B.G. Garchow, S.P. Jog, B. D. Mehta, J.M. Monosso (posthumous), P.P.N. Murthy (2006) Alkaline phytase from *Lilium longiflorum*: purification and structural characterization. *Protein Express. Purif.* 46, 221-232.
- 8) P. P. N. Murthy (2006) Structure and nomenclature of inositol phosphates, phosphoinositides, and glycosylphosphatidylinositols. Subcellular Biochemistry series: Volume 39, **Biology of Inositols and Phosphoinositides** (Eds. A. N. Lahiri and B.B. Biswas), Plenum Publishing Co. Ltd., London, pp 1-20.
- 9) P. Yang, P.P.N. Murthy, R.E. Brown (2005) Synergy of intramolecular hydrogen bonding network in myo-inositol-2-phosphate: theoretical investigations into the electronic structure, proton transfer and pKa. *J. Amer. Chem. Soc.* 127, 15848-15861.
- 10) S.P. Jog, B. G. Garchow, B. D. Mehta, P.P.N. Murthy (2005) Alkaline phytase from lily pollen: Investigation of biochemical properties. *Archives of Biochemistry and Biophysics* 440, 133-140
- 11) G. Pliska-Matyshak, B. Narasimhan, R. Kinnard, S. Carstensen, M. Ritter[#], L. von Weymarn[#], and P.P.N. Murthy (1997) Novel phosphoinositides in barley aleurone cells, additional evidence for the presence of phosphatidyl-scyllo-inositol. *Plant Physiol.* 113, 1385-1393.

[#] Undergrad student

Synergistic Activities

- 1) Developing a new inquire-based lab course "Research methods in Biomolecular Chemistry". This project is funded by the NSF-CCLI program.
- 2) Developed a new course for chemistry majors interested in teaching high school chemistry: Design and Operation of a High School Chemistry Laboratory. I worked with local high schools to develop this course. The aim of the course is to address topics necessary for the design and introduction of a chemistry laboratory in high schools including ordering, storage, tracking, and disposal of chemicals, safety issues, developing new lab experiments and demonstrations, preparation of reagents on large scale, and internships in local high schools. The need for such a course was identified by a workshop organized by the American Chemical Society on Secondary Chemical Education curriculum and our own alumni. This course is now offered every other year.
- 3) Worked on a curriculum for two new degree programs now offered in the Department – BS in Biochemistry and Molecular Biology and BS in Pharmaceutical Chemistry
- 4) Developed a new course for the BS in Pharmaceutical Chemistry program - Pharmaceutical Chemistry I – Mechanism of Drug Action. This course is now offered every year.
- 5) Finalist for Outstanding Teacher of the Year award for 1989-90 in Assistant Professor category.

Collaborators and Other Affiliations

Dr. Richard Brown, Dept. of Chemistry, Michigan Technological University
Dr. Haiying Liu, Dept of Chemistry, Michigan Technological University
Dr. Victor Raboy, USDA, Aberdeen, Idaho

Graduate Advisors and Postdoctoral Sponsors

Ph.D. Advisor: Prof. David Cane, Brown University
Postdoctoral sponsor: Prof. Masato Koreeda, Univ of Michigan, Ann Arbor, MI
Postdoctoral sponsor: Prof. Bernard Agranoff, Univ of Michigan, Ann Arbor, MI

Thesis Advisor (Ph.D.)

Dr. Laura Barrientos, Center for Disease Control, Atlanta; Dr. Bhuvараha Murthy, Ohio State University, Columbus, Ohio; Dr. Barry Garchow, Univ of Pennsylvania; Dr. Sonali Jog, Univ of Southern California; Dr. Bakul Dhagat Mehta, Univ of Missouri, Columbia; Dr. Gay Pliska-Matyshak, Henry Ford Hospital, Detroit, Dr. Steven Johnson, Univ of Illinois, Urbana-Champaign

Biographical Sketch

Ashutosh Tiwari

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Web page: <http://www.chemistry.mtu.edu/pages/faculty/faculty.php?fac=tiwari>

Current research interests

'Protein misfolding diseases' with special focus on neurodegenerative diseases.

Education

Jawaharlal Nehru University (JNU), New Delhi, India	Biotechnology	Ph.D. 1999
Jamia Millia Islamia, New Delhi, India	Biosciences	M.Sc. 1993
All-India Institute of Medical Sciences (AIIMS), New Delhi India	Human Biology, specialization in biophysics	1991 B.Sc.(Hons)

Appointments

2009 –	Assistant Professor, Department of Chemistry, Michigan Technological University, Houghton, MI.	
2009 –	Adjunct Research Assistant Professor, Department of Neurology, University of Massachusetts Medical School (UMMS), Worcester, MA.	

2005 – 2009 Research Assistant Professor, Department of Neurology, UMMS, MA.
2003 – 2005 Instructor, Department of Neurology, UMMS, MA.
2000 – 2003 Post-Doctoral Fellow, Department of Neurology, UMMS, MA.
1999 – 2000 Post-Doctoral Fellow, Department of Neurology, Massachusetts General Hospital, Boston, MA.
1995 – 1999 Senior Research Fellow, Center for Biotechnology, JNU, New Delhi, INDIA.
1993 – 1995 Junior Research Fellow, Center for Biotechnology, JNU, New Delhi, INDIA.

Five recent publications

- 1) Molnar KS, Karabacak NM, Johnson JL, Wang Q, **Tiwari A**, Hayward LJ, Coales SJ, Hamuro Y, and Agar JN. A common property of amyotrophic lateral sclerosis-associated variants: Destabilization of the Cu/Zn superoxide dismutase electrostatic loop. **J Biol Chem.** (2009) **284**(45): 30965-30973.
- 2) **Tiwari A**, Liba A, Sohn SH, Seetharaman SV, Bilsel O, Matthews CR, Hart PJ, Valentine JS, and Hayward LJ. Metal deficiency increases aberrant hydrophobicity of mutant superoxide dismutases that cause amyotrophic lateral sclerosis. **J Biol Chem.** (2009) **284**(40): 27746–27758.
- 3) Karabacak NM, Li L, **Tiwari A**, Hayward LJ, Hong P, Easterling ML, and Agar JN. Sensitive and specific identification of wild-type and variant proteins from 8 to 669 kDa using top-down mass spectrometry. **Mol Cell Proteomics.** (2009) **8**(4): 846-56.
- 4) Cao X, Antonyuk S, Seetharaman SV, Whitson LJ, Taylor AB, Holloway SP, Strange RW, Doucette PA, Valentine JS, **Tiwari A**, Hayward LJ, Padua S, Cohlberg JA, Hasnain SS, and Hart PJ. Structures of the G85R variant of SOD1 in familial ALS. **J Biol Chem.** (2008) **283**(23): 16169-77.
- 5) Shaw BF, Lelie HL, Durazo A, Nersissian AM, Xu G, Chan PK, Gralla EB, **Tiwari A**, Hayward LJ, Borchelt DR, Valentine JS, and Whitelegge JP. Detergent-insoluble aggregates associated with amyotrophic lateral sclerosis in transgenic mice contain primarily full-length, unmodified superoxides dismutase-1. **J Biol Chem.** (2008) **283**(13): 8340-8350.

D) Five additional significant publications:

- 1) **Tiwari A** and Bhat R. Stabilization of yeast hexokinase A by polyol osmolytes: Correlation with physicochemical properties of aqueous solutions. **Biophys Chem.** (2006) **124**(2): 90-99.
- 2) **Tiwari A**, Xu Z, and Hayward LJ. Aberrantly increased hydrophobicity shared by mutants of Cu/Zn superoxide dismutase in familial amyotrophic lateral sclerosis. **J Biol Chem.** (2005) **280**(33): 29771-29779.
(Featured in August 19, 2005 issue of the Journal of Biological Chemistry as ‘**Paper of the Week**’ (J Biol Chem. (2005) **280**: e99939)).
- 3) Rodriguez JA, Shaw BF, Durazo A, Sohn SH, Doucette PA, Nerissian AM, Faull KF, Eggers DK, **Tiwari A**, Hayward LJ, and Valentine JS. Destabilization of apoprotein is insufficient to explain Cu,Zn-superoxide dismutase-linked ALS pathogenesis. 4) **Proc Natl Acad Sci USA.** (2005) **102**(30): 10516-10521.
- Chacko B, Qin BY, **Tiwari A**, Shi G, Lam S, Hayward LJ, deCaestecker M, and Lin K. Structural Basis of Heteromeric Smad Protein Assembly in TGF- β Signaling. **Mol Cell.** (2004) **15**(5): 813-23.
- 5) **Tiwari A** and Hayward LJ. Familial ALS Mutants of Cu/Zn Superoxide Dismutase are Susceptible to Disulfide Reduction. **J Biol Chem.** (2003) **278**(8): 5984-5992.

Synergistic activities

- 1) Ad-hoc reviewer for Biophysical Journal, Journal of Neuroscience Research, and Cellular and Molecular Life Sciences.
- 2) Member of ‘Graduate Admissions and Recruiting Committee’ for Chemistry department at MTU.
- 3) Member of ‘Biochemistry Curriculum Committee’ for Chemistry department at MTU.
- 4) Member of ‘University Animal Care Committee’ and ‘Institutional Biosafety Committee’ at MTU.

Collaborators

Robert Brown (UMMS), Lawrence Hayward (UMMS), Zuoshang Xu (UMMS), Hoi Pang Low (UMMS), Robert Matthews (UMMS), Jeffrey Agar (Brandeis University); John Hart (UTHSCA), Joan Valentine (UCLA), Patricia Heiden (MTU), Haiying Liu (MTU), Rudy Luck (MTU).

Supervising and advising of students and trainees

At UMMS: Brian Mitchell Haas (summer student, Harvard University, MA); Benoy M. Chacko (graduate student, UMMS); Charusheila Ramkumar (graduate rotation student, UMMS) and Laura Baldassari (summer student, Worcester Polytechnic Institute, MA).

At MTU: Kyrie Pappas (project CH471, Spring 2010); Claire Drom (CH4995, Fall 2010).

Research technicians supervised: At UMMS: **Hongru Zhou (UMMS); Kumudini Misra (UMMS).**

Biographical Sketch

Martin Thompson

Associate Professor

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Education

Arizona State University, Tempe, AZ. Ph.D. Chemistry **Ph.D. 2000**
Dissertation “Synthesis and Characterization of the Photophysical and Photochemical Properties of Sequence Specific DNA-Binding Probes,” Advisor: Neal Woodbury
Arizona State University, Tempe, AZ. Chemistry, with a Concentration in Biochemistry **B.S. 1995,**

Appointments

2009-present **Associate Professor**, Department of Chemistry, Michigan Technological University **Assistant Professor**, Department of Chemistry, Michigan Technological University (2003-2009)
2004 **Visiting Scientist**, Department of Biological Chemistry, University of Michigan Medical Center
2002-2003 **Postdoctoral Fellow**, Department of Biological Chemistry, University of Michigan
2000-2002 **Postdoctoral Assistant**, Howard Hughes Medical Institute, University of Michigan

Other Activities

2010-present **Councilor**, Upper Peninsula Section of the American Chemical Society
2007 **Panel Member**, National Institutes of Health, Center for Scientific Review, Study Section ZRG1 GGG-F(90) 2006-2009 **Chair**, Upper Peninsula Section of the American Chemical Society
Reviewer for: FEBS Letters, Protein Expression and Purification, Journal of Medical & Biological Sciences

Professional Affiliations

American Chemical Society, Biophysical Society, Council on Undergraduate Research

Research Interests

Fluorescence-based bioanalytical methods and biosensors; quantification of modification-dependent protein-protein interactions associated with transcription; development of assays for drug discovery; molecular recognition; cell-specific targeting using peptidomimetics;

Five Significant Publications

- 1) Thompson, M. (2010) Thermodynamic and Kinetic Analysis of Bromodomains–Histone Interactions. Vol 466, Biothermodynamics, Part B. Methods in Enzymology, pp.383-407
- 2) Thompson, M. (2009) Polybromo-1: The chromatin targeting subunit of the PBAF complex. *Biochimie* 91, 309-319.
- 3) Thompson, M., and Chandrasekaran, R. (2008) Thermodynamic analysis of the acetylation dependence of bromodomain-histone interactions. *Anal. Biochem.* 374, 304-312.
- 4) Kupitz, C., Chandrasekaran, R., and Thompson, M. (2008) Kinetic analysis of acetylation-dependent Pb1 bromodomain-histone interactions. *Biophys. Chem.* 136, 7-12.
- 5) Chandrasekaran, R., and Thompson, M. (2007) Polybromo-1 bromodomains bind histone H3 at specific acetyl-lysine positions. *Biochem. Biophys. Res. Comm.* 355, 661-666.

Additional Significant Publications

- 1) Thompson, M. (2007) Spectral properties and DNA targeting features of thiazole orange-peptide bioconjugates. *Biomacromolecules* 8, 3628-3633.
- 2) Thompson, M. (2006) Synthesis, photophysical effects, and DNA targeting properties of oxazole yellowpeptide bioconjugates, *Bioconjugate Chemistry* 17, 507-513.
- 3) Chandrasekaran, R., and Thompson, M. (2006) Expression, purification and characterization of individual bromodomains from human Polybromo-1. *Prot. Expr. Purif.* 50, 111-117.
- 4) Babendure, J., Liddell, P. A., Bash, R., LoVullo, D., Schiefer, T. K., Williams, M., Daniel, D. C., Thompson, M., Taguchi, A. K. W., Lohr, D., and Woodbury, N. W. (2003) Development of a fluorescent probe for the study of nucleosome assembly and dynamics, *Anal. Biochem.* 317-327, 1-11.
- 5) Thompson, M., and Woodbury, N. (2001) Thermodynamics of Specific and Non-specific DNA-binding by Cyanine Dye Labeled DNA-binding Domains, *Biophysical J.* 81, 1793-1804.

Recent Collaborators

Sarah Green (MTU), Haiying Liu (MTU), Lanrong Bi (MTU), Shiyue Fang (MTU), Kedmon Hungwe (MTU), Pushpalatha Murthy (MTU), Justin Carlson (Chemotrope)

Graduate and Postgraduate Advisees

Current graduate students: Katrina Bugielski

Past graduate students: Renu Chandrasekaran, Jon Maxwell, Renee Kerr, Mark Parmley, Wendy VanAken, Joshua Bailey

Undergraduate students: Talisha Sutton, Sam Stam, Christopher Kupitz, Andrew Spaeth, Kelli Whelan, Kirk Koebke, Jesus Fransisco Glaus Garzon, Marie Wilkening, Joshua Bailey

Postdoctoral Advisees: Alexis Black, Momoko Tajiri

Biographical Sketch

Hairong Wei

Assistant Professor of Systems Biology & Molecular Biology

School of Forest Resources and Environmental Science

Michigan Technological University

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<http://forest.mtu.edu/faculty/wei/index.htm>

Current Research Interests

Systems Biology: Gene network constructions & gene function prediction

Bioinformatics and Genomics on tree growth & wood development

Biological database design and development

Impact of CO₂ and abiotic stress on gene network

New algorithm/software/pipeline development

Education

Beijing Forestry University, P.R. China

Agricultural Sci.

BS & 4 years

Beijing Forestry University, P.R. China

Plant Genetics

MS & 3 years

University of Hawaii at Manoa

Plant Mol. Biol

Ph.D. & 5 years

University of Chicago

Computer Sci.

MS & 1.5 years

University of Minnesota

Bioinformatics

Post-doc & 1.5 years

University of Alabama at Birmingham

Biostatistics

Post-doc & 1 year

Appointments

- 2008~Present Assistant Professor, Michigan Technological University, Houghton, MI
- 2006~2008 Bioinformatics Developer, Wicell Research Institute, Inc., Madison, WI
- 2005~2006 Bioinformatics Scientist, Operon Biotechnologies, Inc., Huntsville, AL
- 2004~2005 Postdoc, Biostatistics, University of Alabama, Birmingham, AL
- 2003~2004 Postdoc, Bioinformatics, University of Minnesota, Minneapolis, MN
- 1996~2001 Res. Assistant, Plant Mol. Biology, University of Hawaii, Honolulu, HI
- 1995~1996 Res. Assistant, Plant Genetics, University of Hawaii, Honolulu, HI
- 1989~1995 Assistant Professor, and Lecturer, Forestry Genetics, Beijing Forestry University

Some selected publications

- 1) Cui, X, T. Wang, H.S. Chen, V. Busov and H. Wei. 2010 TF-finder: A software package for identifying transcription factors involved in biological processes using microarray data and existing knowledge base. *BMC Bioinformatics*, 11:425
- 2) Ming, R., S. Hou, ..., H. Wei, ..., M. Alam. 2008. The draft genome sequence of transgenic papaya, *Carica papaya*. *Nature*, Vol. 452, No. 7190:991-996.
- 3) Wei, H., P. F. Kuan, S. Tian, C. Yang, J. Nie, S. Sengupta, V. Ruotti, G. Jonsdottir, S. Keles, J. Thomson and R. Stewart. 2008. A study of the relationships between oligonucleotide properties and hybridization intensity in NimbleGen platform. *Nucleic Acids Research*, Vol. 36, No. 9:2926-2938.
- 4) Pan, G., S. Tian, J. Nie, C. Yang, V. Ruotti, H. Wei, G. Jonsdottir, R. Stewart, and J. Thomson. 2007. Whole genome analysis of Histone H3 lysine 4 and lysine 27 methylation in human embryonic stem cells. *Cell Stem Cell*, Vol. 1, No 3:299~312.
- 5) Wei, H, S. Persson, T. Mehta, V. Srinivasasainagendra, L. Chen, G. Page, C. Somerville, A. Loraine. 2006. Transcriptional coordination of the metabolic network in Arabidopsis thaliana. *Plant Physiology*. 142(2):76274.
- 6) Persson, S., H. Wei, J. Milne, G. Page, C. Somerville. 2005. Identification of genes required for cellulose synthesis by regression analysis of public microarray data sets. *Proc Natl Acad Sci USA*, 102: 8633-8638. (Faculty 1000 evaluation).
- 7) Wei, H., Y. Kaznessis. 2005. Inferring gene regulatory relationships by combining target-target pattern recognition and regulator-specific motif examination. *Biotechnology and Bioengineering*. Vol. 89, No1: 53-77.
- 8) K.M., S. Bhawan, T. Majima, H. Wei, V. Kumar. 2003. Cutting Edge: The NK cell receptor 2B4 augments Ag-specific CTL activity through CD48 ligation on neighboring T cells. *Journal of Immunology*. Vol.170, No 10: 4881
- 9) Albert, H and H. Wei. Sugarcane Ubi9 gene promoter and methods of use thereof. 2004. U.S. Patent No. 6706948 | Promoter of the sugarcane Ubi9 gene. 2004. U.S. Patent No. 6686513 B1 | Promoter of the sugarcane Ubi4 Gene. 2003. U.S. Patent No. 6638766 (<http://www.uspto.gov>).

Teaching

FW4099	Programming Skills for Bioinformatics	Fall 2009, 2011
FW5082	Gene Expression Data Analysis	Fall 2010, 2012
CS2321	Data Structure in Java	Spring 2011
FW4500	Experimental Design and Data Analysis for Natural Science	Spring 2012

Recent Synergistic Activities

- 1) Grant Proposal Reviews: NSF Organism and Environment Interaction. 2010
- 2) Grant Proposal Reviews: NSF of China Forestry Biotechnology, 2010.
- 3) Invited speaker: International Conference on Sustainable Management of Multi-purpose Poplar Plantations, IUFRO, China, 2010
- 4) Invited speaker: Plant and Animal Genome XIX Conference, Jan 2011, San Diego, California.

Collaborators & Collaborators & Other Affiliations (within last 48 months)

Advisor

Fang Ruan, Ph.D. student in Systems Biology, Spring, 2010 to Present

Yang Li, Master student in Genomics. Fall, 2009 to Present

Hang Zhang, Master student in Computer Science, Spring, 2010 to Present

Biographical Sketch

Thomas Werner

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E-mail: twerner@mtu.edu

Education

2005 Ph.D., Cell and Molecular Biology, Umeå Center for Molecular Pathogenesis, Umeå

University, Umeå, Sweden.

1997 M.Sc., Biology, Jena University, Jena, Germany.

Appointments

2010 - present Assistant Professor, Department of Biological Sciences, Michigan Technological University, Houghton, MI.

2005 - 2010 Post-Doctoral Research Associate, Department of Molecular Biology, University of Wisconsin-Madison, Madison, WI.

Honors and Awards

2005 - 2008 Postdoctoral Long-term fellowship, Human Frontier Science Program

2005 - 2007 Postdoctoral Long-term fellowship, European Molecular Biology Organization (declined in favor of the HFSP fellowship)

1998 – 2000 Graduate fellowship Umeå University

1990 Special Award at the National Youth Science and Technology Competition “Jugend Forscht” (“Youth researches”), Mainz, Germany.

Peer Reviewed Publications

1) Werner T., Koshikawa S., Williams T.M., Carroll S.B. (2010) Generation of a novel wing color pattern by the Wingless morphogen. *Nature*, Vol. 464, pp. 1143-1148. (Cover article)

2) Rebeiz M., Ramos-Womack M., Jeong S., Andolfatto P., Werner T., True J., Stern D.L., Carroll S.B. (2009) Evolution of the tan Locus Contributed to Pigment Loss in *Drosophila santomea*: A Response to Matute et al. *Cell*, Vol. 139, pp. 1189-1196.

3) Williams T.M., Selegue J.E., Werner T., Gompel N., Kopp A., and Carroll S. B. (2008) The Regulation and Evolution of a Genetic Switch Controlling Sexually Dimorphic Traits in *Drosophila*. *Cell*, Vol. 134, pp. 610–623.

4) Jeong S., Rebeiz M., Andolfatto P., Werner T., True J., Carroll S.B. (2008) The Evolution of Gene Regulation Underlies a Morphological Difference between Two *Drosophila* Sister Species. *Cell*, Vol. 132, pp. 783-93.

5) Werner T., Borge-Renberg K., Mellroth P., Steiner H. and Hultmark D. (2003) Functional diversity of the *Drosophila* PGRP-LC gene cluster in the response to LPS and peptidoglycan. *J Biol Chem*, Vol. 278, Issue 29, pp. 26319-22.

6) Choe K.M., Werner T., Stoven S., Hultmark D, Anderson K.V. (2002). Requirement for a Peptidoglycan Recognition Protein (PGRP) in Relish Activation and Antibacterial Immune Responses in *Drosophila*. *Science*, Vol. 296, Issue 5566, pp. 359-62.

7) Werner, T., Liu, G., Kang, D., Ekengren, S., Steiner, H. and Hultmark, D. (2000). A family of peptidoglycan recognition proteins in the fruit fly *Drosophila melanogaster*. *Proc Natl Acad Sci USA*, Vol. 97, Issue 25, pp. 13772-7.

Memberships

Michigan Tech Biotechnology Research Center (BRC)

Current Collaborations

Sean B. Carroll and Shigeyuki Koshikawa, University of Wisconsin-Madison, WI.

Advisors

M.Sc. Advisor: Dr. Andreas Henke, Jena University, Jena, Germany

Ph.D. Advisor: Dr. Dan Hultmark, Umeå Center for Molecular Pathogenesis, Umeå University, Umeå, Sweden.

Postdoctoral Advisor: Dr. Sean B. Carroll, University of Wisconsin-Madison, WI.

Present Undergraduate Students

Bryant Kollie, Roger Yeager

Biographical Sketch

Ramakrishna Wusirika

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Education

National Chemical Laboratory, and University of Pune, Pune, India
 University of Hyderabad, Hyderabad, India
 University of Hyderabad, Hyderabad, India
 Osmania University, Hyderabad, India

Biochemistry Ph.D., 1995
 Biochemistry M.Phil., 1990
 Biochemistry M.Sc., 1988
 Biology B.Sc., 1986

Appointments

2009 – present	Associate Professor	Department of Biological Sciences, Michigan Technological University,	Houghton, MI.
2003 - 2009	Assistant Professor	Department of Biological Sciences, Michigan Technological University,	Houghton, MI.
1999 - 2003	Post-Doctoral Research Fellow	Department of Biological Sciences, Purdue University, West Lafayette,	IN.
1997 - 1999	Post-Doctoral Research Fellow	Department of Horticulture, Purdue University, West Lafayette, IN.	
1995 - 1997	Post-Doctoral Research Fellow	Division of Biochemical Sciences, National Chemical Laboratory, Pune,	India.

Recent Publications

- 1) Wusirika R, Li K, Bennetzen JL, Phillips RL (2010) Zea. In: Kole C (ed) Wild Crop Relatives: Genomic and Breeding Resources. Vol 1: Wild Relatives of Cereals. Springer, Heidelberg, Berlin, New York (in press)
- 2) Krom, N., and Ramakrishna, W. (2010) Conservation, rearrangement, and deletion of gene pairs during the evolution of four grass genomes. *DNA Res* doi: 10.1093/dnares/dsq022
- 3) Dhadi, S.R., Krom, N., and Ramakrishna, W. (2009) Genome-wide comparative analysis of putative bidirectional promoters from rice, *Arabidopsis* and *Populus*. *Gene* 429: 65-73.
- 4) Krom, N., and Ramakrishna, W. (2008) Comparative analysis of divergent and convergent gene pairs and their expression patterns in rice, *Arabidopsis*, and *Populus*. *Plant Physiol.* 147: 1763-1773.
- 5) Krom, N., Recla, J., and Ramakrishna, W. (2008) Analysis of genes associated with retrotransposons in the rice genome. *Genetica* 134: 297-310.
- 6) Xu, Z., and Ramakrishna, W. (2008) Retrotransposon insertion polymorphisms in six rice genes and their evolutionary history. *Gene* 412: 50-58.
- 7) Oakley, R.V., Wang, Y-S., Ramakrishna, W., Harding, S.A., and Tsai, C-J. (2007) Differential expansion and expression of α - and β -tubulin gene families in *Populus*. *Plant Physiol.* 145: 961-973.
- 8) Nagy, E., Lee, T-C., Ramakrishna, W., Xu, Z., Klein, P., SanMiguel, P., Cheng, C-P., Li, J., Devos, K., Schertz, K., Dunkle, L., and Bennetzen, J. (2007) Fine mapping of the *Pc* locus of *Sorghum bicolor*, a gene controlling the reaction to a fungal pathogen and its host-selective toxin. *Theor. Appl. Genet.* 114: 961-970.
- 9) Yan, L., Loukoianov, A., Blechl, A., Tranquilli, G., Ramakrishna, W., SanMiguel, P., Bennetzen, J.L., Echenique, V., and Dubcovsky, J. (2004) The wheat VRN2 gene is a flowering repressor down-regulated by vernalization. *Science* 303: 1640-1644.
- 20) Bennetzen, J.L., Coleman, C., Liu, R., Ma, J., and Ramakrishna, W. (2004) Consistent over-estimation of gene number in complex plant genomes. *Curr. Opin. Plant Biol.* 7: 732-736.
- 11) Lai, J., Ma, J., Swigonova, Z., Ramakrishna, W., Linton, E., Llaca, V., Tanyolac, B., Park, Y.J., Jeong, O.Y., Bennetzen, J.L., and Messing, J. (2004) Gene loss and movement in the maize genome. *Genome Res.* 14: 1924-1931.
- 12) Swigonova Z, Lai J, Ma J, Ramakrishna W, Llaca V, Bennetzen JL, and Messing J. (2004) Close split of sorghum and maize genome progenitors. *Genome Res.* 14: 1916-1923.
- 13) Ramakrishna W, Deng Z, Ding CK, Handa AK, Ozminkowski RH Jr. A novel small heat shock protein gene, *vis1*, contributes to pectin depolymerization and juice viscosity in tomato fruit. (2003) *Plant Physiol.* 131: 725-735.

Synergistic Activities

- 1) Member, American Society of Plant Biologists
- 2) Coordinator, Bioinformatics Program, Michigan Tech University
- 3) Ad hoc reviewer for several international journals and funding agencies (NSF, US-Israel BARD and U.S. Civilian Research and Development Fund)
- 4) Chief editor for a special issue of International Journal of Plant Genomics

Collaborators

Jeffrey Bennetzen (U. Georgia, GA), Phillip SanMiguel (Purdue Univ, IN), Jianxin Ma (Purdue Univ, IN), Ramanjulu Sunkar (Oklahoma State Univ, OK), Chung-Jui Tsai (U. Georgia, GA), Erich Grotewold (Ohio State Univ, OH), Sastry Jayanty (Colorado State Univ, CO), Rupali Datta (MTU), Wan Jin Jahng (MTU), Charles Kerfoot (MTU)
 Graduate and Postdoctoral Advisors

PhD Advisor: Prabhakar Ranjekar, National Chemical Laboratory, Pune, India

Postdoctoral Advisor: Jeffrey Bennetzen, University of Georgia, Athens, GA, Avtar Handa, Purdue University, West Lafayette, IN, Prabhakar Ranjekar, National Chemical Laboratory, Pune, India

Thesis Advisor

Current Ph.D.

Surendar Reddy Dhadi, Kefeng Li and Sheikh Rafi

Past Ph.D./M.S.

Nicholas Krom, Zijun Xu, Deepak Kumar and Patience Tenney

Current Visiting Scientist

Zhiying Dou

Past Visiting Scientist

Bashir Yusuf (Ahmadu Bello University, Nigeria)

Undergraduate Students Advised

Nari Kang, Matt Ogg, Sulagna Gupta, Katie Kruger, Megan McQuillan, Jill Recla, Benjamin Baer and Holly Grunst

Introduced to Senate: 19 October 2011

Approved by Senate: 02 November 2011

Approved by Administration: 11 November 2011

Approved by BOC: 09 December 2011

Approved by State: 20 January 2012