Graduate Program in Molecular Biosciences and Bioengineering

History

The Department of Molecular Biosciences and Bioengineering (MBBE) was established in 1999 as a result of a reorganization within the College of Tropical Agriculture and Human Resources (CTAHR). Most faculty in MBBE came from three original CTAHR departments, Plant Molecular Physiology (PMP), Environmental Biochemistry, and Biosystems Engineering. Among these three departments, only PMP had a graduate program that offered both PhD and MS degrees. The PMP Graduate Program started in 1985 and focused primarily on plant biology and biotechnology.

After the formation of the MBBE department, the PMP Graduate Program was reorganized, expanded and renamed as the Graduate Program in Molecular Biosciences and Bioengineering in 2000. The scope of the MBBE Graduate Program was widened to include molecular biology, biochemistry, bioinformatics, cell biology, biotechnology, and bioengineering aspects of plant science, tropical agriculture, aquaculture, environmental bioremediation, bioengineering and biomedical sciences.

With the expansion of the scope of the graduate program, many other faculty from other UHM departments and scientists from other scientific institutes in Hawaii joined the MBBE Graduate Program as co-operating and affiliate graduate faculty. The number of students also started to increase over the years. A new set of guidelines and requirements has been developed to maintain a high standard of the program. Currently, many MBBE graduate students are supervised by faculty from John A. Burns School of Medicine, Cancer Research Center, Pacific Biomedical Research Center, Queens Medical Center, Hawaii Agricultural Research Center, Oceanic Institute, Sea Grant College Program, School of Ocean and Earth Science and Technology, College of Engineering and several departments including Microbiology, Zoology, Human nutrition, Food and Animal Sciences, and Plant and Environmental Protection Sciences. Thus, MBBE became an interdisciplinary graduate program involving tropical agriculture, natural sciences, engineering and biomedical sciences.
Graduate Program in Molecular Biosciences & Bioengineering (MBBE)

The Molecular Biosciences and Bioengineering (MBBE) graduate program offers both MS and PhD degrees. The MBBE research and graduate training center around understanding the biochemical, nutritional and molecular-biological processes that underlie growth, development, photosynthesis, and stress, especially as related to tropical agriculture, aquaculture, plant and environmental biotechnology, biomedical science and bioengineering. Many MBBE graduate students are supervised and supported by cooperating and affiliate graduate faculty from John A. Burns School of Medicine, Cancer Research Center, Pacific Biomedical Research Center, Hawaii Agricultural Research Center, Sea Grant College Program, School of Ocean and Earth Science and Technology, College of Engineering and several departments including Microbiology, Zoology, Human nutrition, Food and Animal Sciences, and Plant and Environmental Protection Sciences.

History

The Department of Molecular Biosciences and Bioengineering (MBBE) was established in 1999 as result of a reorganization within the College of Tropical Agriculture and Human Resources (CTAHR). Most faculty in MBBE came from three original CTAHR departments, Plant Molecular Physiology (PMP), Environmental Biochemistry, and Biosystems Engineering. Among these three departments, only PMP had a graduate program that offered both PhD and MS degrees. The PMP Graduate Program started in 1985 and focused primarily on plant biology and biotechnology.

After the formation of the MBBE department, the PMP Graduate Program was reorganized, expanded and renamed as the Graduate Program in Molecular Biosciences and Bioengineering in 2000. The scope of the MBBE Graduate Program was widened to include molecular biology, biochemistry, bioinformatics, cell biology, biotechnology, and bioengineering aspects of plant science, tropical agriculture, aquaculture, environmental bioremediation, bioengineering and biomedical sciences.

With the expansion of the scope of the graduate program, many other faculty from other UHM departments and scientists from other scientific institutes Hawaii joined the MBBE Graduate Program as co-operating and affiliate graduate faculty. The number of students also started to increase over the years. A new set of guidelines and requirements has been developed to maintain a high standard of the program. Currently, many MBBE graduate students are supervised by faculty from John A. Burns School of Medicine, Cancer Research Center, Pacific Biomedical Research Center, Queens Medical Center, Hawaii Agricultural Research Center, Oceanic Institute, Sea Grant College Program,
School of Ocean and Earth Science and Technology, College of Engineering and several departments including Microbiology, Zoology, Human nutrition, Food and Animal Sciences, and Plant and Environmental Protection Sciences. Thus, MBBE became an interdisciplinary graduate program involving tropical agriculture, natural sciences, engineering and biomedical sciences.

**Entrance Requirements**

- Minimum qualifications for admission as a regular student are an undergraduate degree from an accredited U.S. college or university or equivalent degree from a recognized foreign institution of higher learning and a GPA of at least 3.0 on a 4.0 scale.

- All prospective students must submit scores from the GRE General Test. In cases where foreign students encounter difficulty in taking the examination, submission of scores may be delayed with permission of the Graduate Division. Foreign students must also submit TOEFL scores (see Graduate Bulletin for exceptions). A minimum TOEFL score of 100 in internet-based test is required.

- All applicants are expected to have completed courses or equivalents in physics, chemistry, basic biology, genetics, biochemistry, physiology and one additional upper division course in cellular or molecular biology. While not a requirement, physical chemistry is highly recommended. Students may be accepted with deficiencies in one or more of these areas, however deficiencies must be made up during the first year as a graduate student. Such courses may not be used for graduate credit.
General guidelines and requirements for MS Plan-A students in MBBE:

1. **Minimum course requirements**: 12 credits of 600-level courses (not including MBBE 699), 6 credits of 400 level courses (not including MBBE 499), 6 credits of MBBE 699 and 6 credits of MBBE 700. All courses must be approved by your committee and the Graduate Chair. Graduate students are encouraged to take one credit seminar (MBBE 610 or equivalent) each academic year. They require at least one seminar credit for MS degree. The thesis proposal or defense seminar cannot be used to meet this requirement.
2. **Two-page proposal.** Like PhD students, MS students also need to discuss with their major advisors about their research projects and write a two-page proposal within the first semester.

3. **A thesis proposal seminar:** MS students need to present their preliminary results and the plan of work in a proposal seminar. MS students who conduct research in laboratories outside the Manoa campus may present their proposal seminars in their laboratory locations.

4. **Presentation at the CTAHR symposium.** MS plan-A students must make at least one presentation in the CTAHR symposium or another UH symposium. They are encouraged to make presentations in other national and international conferences.

5. **Thesis defense.** MS plan-A students must present a public presentation of work in the final semester. Students should consult with their committee and the Graduate Chair for a convenient date for this presentation at the middle of the final semester. Seminar notice must be posted in appropriate places in the department and other important places. Seminar notice must also be sent by email to all MBBE graduate faculty and students.

**Publication.** Students are encouraged to publish a paper before defense. In publications, the MBBE departmental address should appear as the students’ primary or secondary address. For details, please see point #17 in “General guidelines and requirements for PhD degree in MBBE” above.

**General guidelines and requirements for MS Plan-B students in MBBE:**

1. **Minimum course requirements:** 18 credits of 600-level courses (not including MBBE 699), 9 credits of 400 level courses (not including MBBE 499), 3 credits of MBBE 699. Graduate students are encouraged to take one credit seminar (MBBE 610 or equivalent) each academic year. They require at least one seminar credit for MS degree. The final research presentation cannot be used to meet this requirement. All courses must be approved by the Graduate Chair.

2. **Research report, final presentation and oral exam.** The plan-B students also do a research project for at least one semester. The results of this research should be written as a ‘research report’ and submitted to a committee composed of the research advisor, another faculty and the Graduate Chair. The results also must be presented as a seminar in the final semester. At the end of the presentation, the committee will ask questions about the research project and other related subject. The written report should be about 10-20 pages, double space, and should
contain the following sections: abstract (200-300 words), introduction (background and justification, 1 page), literature review (3-7 pages), objectives, materials and methods (3-7 pages), results and discussion (3-10 pages), and references. For graduation, a student must obtain satisfactory grades in the research report, oral presentation, and the oral exam.

**List of approved courses for MBBE graduate students**

All graduate students are encouraged to take MBBE 401 Molecular Biotechnology or an equivalent course as a prerequisite. The 600-level courses can be selected from the following list of courses. Students can select other courses after obtaining approval from the committee and the Graduate Chair.

**400-level courses:**

- MBBE 401 Molecular Biotechnology
- MBBE402 Principles of Biochemistry
- MBBE405 Marine Genomics and Biotechnology
- MBBE406 Cellular Biology
- MBBE412 Environmental Biochemistry
- MBBE483 Introduction to Bioinformatics Topics for Biologists

**600-level courses**

- MBBE 601 Molecular Cell Biology
- MBBE 620 Plant Biochemistry
- MBBE 621 Metabolic Engineering
- MBBE 625 Biosensors: Principles and Applications
- MBBE 651 Signal Transduction and Regulation of Gene Transcription
- MBBE 680 Methods in Plant Molecular Biology
- MBBE 683 Advance Bioinformatics Topics in Biology
- MBBE 687 Advanced Lab Techniques
- BE 604 Aquaculture Systems
- BE 606 Instrumentation and Measurement
- BE 622 Experimental Methods in Cause-Effect Modeling
- BE 625 Biosensors: Principles and Applications
- BE 634 Biological Treatment
- BE 638 Biosystems Modeling
- BE 648 Biosystems Simulation
- BE 660 Bioseparation processes
- CHEM 633 Molecular Spectroscopy
- PEPS 646 Plant Bacterial Interactions
- PEPS 630 Plant Virology
- PEPS 681 Pesticide toxicology
- BOT 674 Plant Growth and Development
BOT 669 Molecular Systematics and Evolution
CMB 621 Cell Molecular Biology I
CMB 622 Cell Molecular Biology II
CMB 680 Molecular Genetics
MICR 671 Advanced Microbial Genetics
MICR 632 Advanced Microbial Physiology
MICR 625 Advanced Immunology
TPSS 604 Advanced Soil Microbiology
TPSS 614 Cellular Genetics of Crops
TPSS 640 Tissue Culture
OCN 653 Methods in Microbiology Oceanography
Guidelines for preparing a proposal seminar

1. **What is the main idea of your research?** Immediately after the title slide, the main idea must be presented in a simple language, so that everyone in the audience can understand what the research is about. Here you describe what the overall goal is and what you want to invent, discover or develop.

2. **Next, you must give a good justification for your research.** Why is this research important? Why do you need to invest your time and public funds for this research?

3. **What is already known?** You are not required to provide an extensive review of literature. However, you must tell briefly what is known in this field.

4. **What is not known?** After telling briefly what is already known, you have to emphasize what is not known. This should connect you with the specific objectives.

5. **Hypotheses:** You may present your hypotheses here or tie them together with specific objectives (below).

6. **Specific objectives:** Generally, there should be two or more specific objectives. Three is a good number.

7. **Specific objective 1.** Describe how you will accomplish this. Show flow charts if needed. Explain briefly important methods and experiments for this objective.

8. **Specific objective 2.** Describe in the same way as for objective 1.

9. **Specific objective 3.** Describe as for objectives 1 and 2.

10. **Progress to date:** Describe your results so far for each of the objectives. You may not have results for all objectives. You must present convincing results for at least one objective (see below).

11. If you have a lot of results, show only the most important results. Discuss with your supervisor about your most important results. Other results must be available for presentation, if someone asks.

12. **Explain your results slowly.** Make sure that you provide interpretations of your results. Mere presentation of the results will not be enough. You have to explain what these results mean and how they relate to the objectives.
13. **Timetable for completion.** Show a timetable for rest of the experiments.

14. **Discussion with your supervisor:** It is essential that you show your slides and discuss with your supervisor at least one week prior to your presentation. It is also important to make the presentation before your supervisor and your colleagues in the laboratory. Listen to their criticism and try to improve your presentation. Your research subject may be very complicated and many in the audience may not understand some details or certain slides. However, all scientists and MBBE graduate students who come to attend your presentation must be able to understand the main idea and the important points.

### Guidelines for preparing MS/PhD Defense seminar

Seminar notice must be posted in appropriate places in the department and other important places one week before the seminar. Seminar notice must also be sent by email to all MBBE graduate faculty and students.

For both proposal and defense seminars, you may assume that people in the audience have at least a BS degree and some background in biological sciences. That does not mean that everyone will be able to understand everything you present. There can be some high-level experiments that can be understood only by people trained in your research area. However, you should make the best efforts to make at least half of your presentation understandable to most people in the MBBE audience. It does not matter whether you are working on bioinformatics, cancer research, bioengineering, plant molecular biology or any other branches of molecular biosciences or bioengineering, you have to make at least 50% of your presentation understandable to most people in the audience. The following are the guidelines for preparing a defense seminar.

1. Discuss with your supervisor. He/she will help you to make difficult things easy.

2. As you progress in your research, try to make as many presentations as possible, keeping in mind that you are preparing for your final presentation.

3. Explain to your friends, parents, colleagues and others, whenever possible, what your work is about.

4. Do not show too many slides in your final presentation. If you have too many results, you do not have to present all. Present only the most important and most relevant results. Again, discuss with your supervisor about it.
5. Make a powerpoint presentation in front of your supervisor and your lab colleagues at least 10 days prior to your final presentation. Ask them for criticism and try to improve. If necessary, make another presentation before your supervisor 3-4 days prior to your final presentation.

6. **Title slide and a summary preview**: After reading the title, give a well-prepared speech for about 3-5 min describing in simple language what your research is about. Some points that can be addressed here are: how this research started, the most important findings (without details), benefits of these findings, and most importantly how you gained insight, experience, and expertise in research. You have to express your excitement for your work. This is like giving a preview of your presentation in simple words. This will make the audience interested in your presentation. This will also serve as a warm-up for your data presentation.

7. **The problem.** Describe the problem that your research addressed in one or more slides.

8. **Justifications for your work**: Why did you invest 3-5 years of your life for addressing the above problem? Why are these time and money investments justified? (at least one slide).

9. **What was already known when you started?** You may show a number of slides to present a brief review of literature. Discuss with your supervisor about specifics. This must be short. The review of literature must not be dull, it must be connected well with the problem.

10. **Overall goal of your research** (one slide): State how you addressed the problem.

11. **Specific objectives**: Dissect the overall goal into specific doable objectives (one slide).

12. **Objective 1.** State the objective 1 and the associated hypothesis (one slide). At this stage do not rush. In about one min, try to give a simplified preview of the methods and experiments you conducted in this objective. You should have a well-prepared 1 min speech here. This will help to maintain attention of the audience on your work.

13. **Experiments in objective 1.** Using a number of slides, describe the experiments and results for objective 1. You may show short flowcharts to describe methods. Whenever you present some results with tables or graphs, give enough interpretations. Always try to connect results with the problem.
14. **Objectives 2 and 3.** Present in the same way as for objective 1. Do not forget to give a 1 min simplified preview of experiments for each objective before going into details.

15. At the end, remind the audience about the problem you wanted address and how your results addressed some questions. Here again you need to face the audience and stop depending on your slides. Tell briefly (in about 1 min) the highlights of your work.

**Guidelines for preparing dissertation/thesis defense announcement flyer**

1. Take a page in landscape page set-up and divide into two columns. Then fold the paper into half. This will make four half pages (both sides) from a standard A4 size paper. You may use a slightly thick paper.

2. Write your announcement in the format shown in the attached page. Briefly, in the front page, write your dissertation/thesis title, your name etc. In the second page, write the names of your committee members, your publications and future plan. In the third page, provide an abstract of your dissertation/thesis. You may include manuscripts in preparation also under your publications.

3. Prepare this at least one week before the presentation, get your major advisor’s approval and send three copies to the Graduate Chair.

4. If you would like Graduate Chair to send these copies to your previous mentors and your biology or chemistry teachers who helped you to come to the MBBE Graduate Program, please provide their addresses.

5. Print it on color papers. Put on the notice board, send to different people as invitations and distribute copies at the time of presentation. Send copies to all those people whom you acknowledge in your dissertation/thesis.
ORAL PUBLIC EXAMINATION
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Functions of mid and pyd genes required for mimosine degradation by Rhizobium sp. strain TAL1145

Jonathan David Awaya

2:15 PM
October 13, 2005
Agricultural Science Building, Room 219

Department of Molecular Biosciences and Bioengineering
University of Hawaii at Manoa
COMMITTEE MEMBERS

Dr. Dulal Borthakur (Chair)
Dr. Sean Callahan
Dr. Tung Hoang
Dr. John Hu
Dr. Qing Li

PUBLICATIONS


2. Awaya J, Fox PM and Borthakur D (2003) Genes encoding a fructose-1,6-bisphosphate aldolase and a fructose-1,6-bisphosphatase are present within the gene cluster for mimosine degradation in Rhizobium sp. strain TAL1145. Plant Soil 257: 11-18.

3. Awaya J, Walton C and Borthakur D. The pydA-pydB fusion gene produces an active dioxygenase-hydrolase protein in Rhizobium and Escherichia coli that degrades 3-hydroxy-4-pyridone, an intermediate of mimosine metabolism (manuscript in preparation).

FUTURE PLAN

Postdoctoral research at Notre Dame starting on February 1, 2006
ABSTRACT

Mimosine and 3-hydroxy-4-pyridone (HP) are toxic aromatic compounds produced in tree-legume leucaena (Leucaena leucocephala). These can be degraded by some leucaena-nodulating Rhizobium strains, such as TAL1145. Previously, a cosmid clone, pUHR263, containing the mid and pyd genes for mimosine and HP degradation, was isolated from a clone library of TAL1145. The aim of this project was to identify genes for mimosine and HP degradation in pUHR263 and determine their functions. Mimosine degradation by Rhizobium involves at least two major steps; in the first step mimosine is degraded to HP, which is then converted to pyruvate, formate and ammonia in the second step. Two structural genes, pydA and pydB, encode a meta-cleavage dioxygenase and a hydrolase, respectively. pydA and pydB are required for degradation of HP, and pydC, pydD and pydE encode proteins of an ABC-transport system involved in the uptake of HP by TAL1145. pydA, pydB, pydC, pydD, and pydE are induced by HP, although pydA and pydB show low levels of expression in the absence of HP. pydA and pydB are cotranscribed while pydC, pydD, and pydE are each transcribed from separate promoters. pydR is located upstream of the pyd genes and encodes a transcriptional regulator for the activation of pydA and pydB in the presence of HP. Elucidation of the HP degradation pathway in Rhizobium sp. strain TAL1145 may provide a useful strategy to genetically engineer leucaena and rhizosphere bacteria to disrupt the biosynthesis of mimosine and for bioremediation of aromatic toxins, respectively.

(End of the defense seminar announcement flyer)
Graduate Faculty

HARRY AKO, PhD
Specialization/research: biochemistry, aquaculture;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-6600; Fax: 808-956-3542
Email: hako@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/ako.html

JON-PAUL BINGHAM, PhD
Specialization/research: Marine peptide biochemistry, biodegradation;
Assistant Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-6600; Fax: 808-956-3542
Email: <jbingham@hawaii.edu>
http://www.ctahr.hawaii.edu/mbbe/faculty/bingham.html

DULAL BORTHAKUR, PhD
Specialization/research: molecular biology and biotechnology, plant-microbe
interactions, biodegradation, recombinant vaccine;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-6600; Fax: 808-956-3542
Email: dulal@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/borthakur.html

DAVID CHRISTOPHER, PhD
Specialization/research: plant molecular and cellular biology, functional
genomics, biotechnology;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-8550; Fax: 808-956-3542
Email: dchr@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/christopher.html

DANIEL M. JENKINS, PhD
Specialization/research: biosensors and instrumentation;
Associate Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-6069; Fax: 808-956-3542
Email: danielje@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/jenkins.html

SAMIR K. KHANAL, PhD
Specialization/research: Bioenergy and Biobased Products; Waste-to-Energy;
Assistant Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-3812; Fax: 808-956-3542
Email: khanal@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/khanal.html

QING LI, PhD
Specialization/research: environmental biochemistry, biodegradation, proteomics;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-2011; Fax: 808-956-3542
Email: qingl@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/li.html

PRATIBHA V. NERURKAR, PhD
Specialization/research: biochemistry of metabolic disorder and alternative medicine;
Associate Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
GERNOT PRESTING, PhD
Specialization/research: bioinformatics, functional genomics;
Associate Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-8861; Fax: 808-956-3542
Email: gernot@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/presting.html

WEI-WEN WINSTON SU, PhD
Specialization/research: biochemical engineering, plant cell culture, molecular biotechnology;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-3531; Fax: 808-956-3542
Email: wsu@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/su.html

PING-YI YANG, PhD
Specialization/research: bioprocess technology, wastewater engineering;
Professor
Department of Molecular Biosciences & Bioengineering
University of Hawaii at Manoa
1955 East-West Road, Ag. Science 218
Honolulu, HI 96822, USA
Tel: 808-956-8459; Fax: 808-956-3542
Email: pingyi@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/yang.html

Cooperating Graduate Faculty

JOHN S ALLEN III, PhD
Specialization: Biomedical engineering, Physical and Biological Acoustics,
Bubble Dynamics and Cavitation
Associate Professor
ANNE ALVAREZ, PhD  
Specialization/research: plant-pathogen interactions, biocontrol of plant diseases;  
Professor  
Department of Plant and Environmental Protection Sciences  
University of Hawaii at Manoa  
3050 Maile Way  
Honolulu, HI 96822, USA  
Tel: 808-956-7764; Fax: 808-956-2832  
Email: alvarez@hawaii.edu;  
http://www.ctahr.hawaii.edu/peps/people/fac/profile_alvarez.htm

JOHN D AWAYA, PhD  
Specialization: Biodegradation and bioremediation  
Assistant Professor  
Department of Biology  
University of Hawaii at Hilo  
200 W. Kawili St.  
Hilo, HI 96720  
Email: awayaj@hawaii.edu

ANDRÉ S. BACHMANN, PhD  
Specialization/research: tumor growth and cell differentiation;  
Assistant Professor  
Cancer Research Center of Hawaii  
University of Hawaii at Manoa  
1236 Lauhala Street  
Honolulu, Hawaii 96813, USA  
Tel: 808-586-2962; Fax: 808-586-2970  
Email: abachmann@crch.hawaii.edu;  
http://www.crch.org/ProfileBachmann.htm

MICHELE CARBONE, MD, PhD  
Specialization/research: Cancer biology;  
Professor  
Cancer Research Center of Hawaii  
University of Hawaii at Manoa  
651 Ilalo Street, BSB 231  
Honolulu, Hawaii 96813, USA  
Tel: 808-440-4596; Fax: 808-587-0742  
Email: mcarbone@crch.hawaii.edu;
Leng Chee Chang, PhD  
Specialization: protein kinase inhibitors, characterization of natural bioactive compounds, Traditional cultural medicines  
Assistant Professor  
Department of Pharmaceutical Sciences,  
College of Pharmacy  
University of Hawaii Hilo  
34 Rainbow Drive,  
Hilo, Hawaii 96720  
Tel: (808)-933-2906; Fax: (808)-933-2974; E-mail: lengchee@hawaii.edu

SANDRA CHANG, PhD  
Specialization/research: vaccine development, molecular immunology;  
Department of Tropical Medicine, Medical Microbiology and Pharmacology  
Professor  
University of Hawaii at Manoa  
Bioscience Building, Rm. 320H  
651 Ilalo Street  
Honolulu HI 96813  
Tel: 808-692-1607; Cel:808-386-2158  
Email: sandrac@hawaii.edu;  

GERT DE COUET, PhD  
Specialization/research: molecular biology, invertebrate biology, biotechnology;  
Professor  
Department of Zoology, Keller Hall 305  
University of Hawaii at Manoa  
Honolulu, Hawaii 96813, USA  
Tel: 808-956-9686; Fax: 808-956-9812  
Email: couet@hawaii.edu; http://www.hawaii.edu/zoology/faculty/decouet.htm

MICHAEL DUNN, PhD  
Specialization/research: molecular nutrition;  
Associate Professor  
Department of Human Nutrition, Food, and Animal Sciences  
University of Hawai‘i at Manoa  
1955 East-West Road, Ag. Sci 216  
Tel: 808-956-3837; Fax: 808-956-4024  
Email: mdunn@hawaii.edu;

WAEL M. ELSHAMY, PhD  
Specialization: Cancer biology, Metastatic Breast Cancer
Cancer Research Center of Hawaii  
Assistant Professor  
University of Hawaii at Manoa  
651 Ilalo Street, BSB 231C  
Honolulu, HI, 96813  
808-440-4580 (Phone)  
808-587-0790 (Fax)  
Email: welshamy@crch.hawaii.edu

DAVID C. FRITZINGER, Ph.D.  
Specialization: Natural Products and Cancer Biology  
Associate Researcher  
Cancer Research Center of Hawaii  
1236 Lauhala St.  
Honolulu, HI 96813  
Tel: (808) 586-2966  
Fax: (808) 586-2970  
Cell: (808) 282-8843  
Email: dfritzin@crch.hawaii.edu

RUTH D. GATES, PhD  
Specialization: the regulation and de-stabilization of coral/dinoflagellate symbioses, and the evolution and development of animal sensory systems.  
Associate Researcher  
Hawaii Institute of Marine Biology/SOEST  
P.O. Box 1346, Kaneohe, HI 96744-1346  
Tel: 808 236 7420 (office); 808 236 7493 (lab)  
Fax: 808 236 7443  
Email: rgates@hawaii.edu  
http://www.hawaii.edu/HIMB/Faculty/gates.html

GODON GRAU, PhD  
Specialization/research: marine biology;  
Professor  
Department of Zoology and Sea Grant Program, HIG 328  
University of Hawaii at Manoa  
Honolulu, Hawaii 96813, USA  
Tel: 808-959-7031; Fax: 808-956-3014  
Email: sgdirc@hawaii.edu; http://www.hawaii.edu/HIMB/Faculty/grau.html

CHUNG-EUN HA, PhD  
Specialization/research: biochemistry, Human Serum Albumin;  
Associate Professor  
Department of Native Hawaiian Health  
University of Hawaii at Manoa  
651 Ilalo Street, MEB306c
TUNG HOANG, PhD  
Specialization/research: molecular microbiology; bacterial pathogen;  
Associate Professor  
Department of Microbiology  
University of Hawaii at Manoa, Snyder 308  
Honolulu, HI 96822, USA  
Tel: 808-956-4796; Fax: 808-956-5339  
Email: tongh@hawaii.edu;  
http://www.hawaii.edu/microbiology/Hoang/index.htm

JOHN HU, PhD  
Specialization/research: plant virology;  
Professor  
Department of Plant and Environmental Protection Sciences  
University of Hawaii at Manoa  
3050 Maile Way  
Honolulu, HI 96822, USA  
Tel: 808-956-7281; Fax: 808-956-2832  
Email: johnhu@hawaii.edu;  
http://www2.hawaii.edu/~johnhu/

YONG-SOO KIM, PhD  
Specialization/research: animal biotechnology;  
Associate Professor  
Department of Human Nutrition, Food, and Animal Sciences  
University of Hawai'i at Manoa  
1955 East-West Road, Ag. Sci 216  
Tel: 808-956-8335; Fax: 808-956-4024  
Email: ykim@hawaii.edu;

DARREN T. LERNER, PhD  
Specialization: Marine biology  
Associate Director  
University of Hawaii Sea Grant College Program  
2525 Correa Rd, HIG 238  
Honolulu, HI 96822  
Tel: (808) 956-7031  
Email: lerner@hawaii.edu

PINGSUN LEUNG, PhD  
Specialization/research: bioproduction economics, aquaculture, fisheries;  
Professor  
Department of Natural Resource and Environmental Management
CLARK C. LIU, PhD
Specialization/research: bioengineering;
Professor
Department of Civil and Environmental Engineering
University of Hawaii at Manoa
POST 203-F, Honolulu, HI 96822
Tel: 808-956-7658; Fax: 808-956-5014
Email: clarkliu@hawaii.edu; http://www.cee.hawaii.edu/persons/liu/liu.htm

PATRICIA S. LORENZO, PhD
Specialization/research: cancer biology;
Associate Professor
Cancer Research Center of Hawaii
University of Hawaii at Manoa
651 Ilalo Street, BSB 231
Honolulu, Hawaii 96813, USA
Tel: 808-586-5868; Fax: 808-587-0742
Email: plorenzo@crch.hawaii.edu; http://www.crch.org/ProfileLorenzo.htm

WILL C. MCCLATCHEY, PhD
Specialization/research: applied ethnobotany, medicinal plants;
Professor
Department of Botany
University of Hawaii at Manoa
3190 Maile Way, Honolulu, HI 96822
Tel: 808-956-6704; Fax: 808-956-3923;
Email: mcclatch@hawaii.edu;
http://www.ctahr.hawaii.edu/mbbe/faculty/mcclatchey.html

CLIFFORD W. MORDEN, PhD
Specialization/research: molecular systematics;
Associate Professor
Department of Botany
University of Hawaii at Manoa
3190 Maile Way, Honolulu, HI 96822
Tel: 808-956-9636; Fax: 808-956-3923;
Email: cmorden@hawaii.edu; http://www.botany.hawaii.edu/faculty/morden/

VIVEK NERURKAR, PhD
Specialization/research: molecular virology and epidemiology;
Professor
Department of Tropical Medicine, Medical Microbiology and Pharmacology
University of Hawaii at Manoa
Bioscience Building, BSB 325AA
651 Ilalo Street
Honolulu HI 96813
Tel: 808-692-1668; Fax:808-692-1984
Email: nerurkar@pbrc.hawaii.edu;

ROBERT NICHOLS, PhD
Specialization: Beta Amyloid and Presynaptic Nicotinic Receptors
Department of Cell & Molecular Biology
University of Hawai‘i at Manoa
John A. Burns School of Medicine
651 Ilalo St., Honolulu, HI 96813
Tel: 808-692-1568
Email: robert.nichols@hawaii.edu

GUYLANE POISSON, PhD
Specialization: Bioinformatics
Assistant Professor
Information and Computer Science Department
University of Hawaii at Manoa
1680 East-West RD #310B
Honolulu HI 96822
Tel: 808-956-3496
Email: guylaine@hawaii.edu
http://navet.ics.hawaii.edu/~poisson/BiL/index.html

JOE RAMOS, PhD
Specialization/research: cancer biology;
Associate Professor
Cancer Research Center of Hawaii
University of Hawaii at Manoa
651 Ilalo Street, BSB 231
Honolulu, Hawaii 96813, USA
Tel: 808-564-5843; Fax: 808-587-0742; Cel: 808-389-6427;
Email: jramos@crch.hawaii.edu;
http://www.crch.org/ProfileRamos.htm

CITTARANJAN RAY, PhD
Specialization/research: ground water hydrology, bioremediation;
Professor
RALPH SHOHET, MD
Specialization/research: Molecular medicine;
Professor
Department of Medicine
University of Hawai‘i at Manoa
651 Ilalo St., Bio-Sciences Building 217, BSB-211D, Honolulu, HI 96813
Honolulu, HI 96813
Tel: 808-692-1469; Fax 808-692-1966
Email: shohet@hawaii.edu;
http://www.hawaii.edu/shohet/

ALEX J. STOKES, PhD
Specialization/research: cell biology;
Assistant Professor
Department of Medicine, JABSOM
University of Hawaii
Biosciences Building 320,
651 Ilalo Street, Honolulu, HI 96813
Tel: (808)-692-1633
Email: astokes@hawaii.edu

CLYDE TAMARU, PhD
Specialization/research: aquaculture;
Associate Researcher
Sea Grant Extension Service
2525 Correa Road, HIG 205
Honolulu, HI 96822
Tel: 808-956-2869; Fax 808-956-2858
Email: ctamaru@hawaii.edu;

ANDRE THERIAULT, PhD
Specialization/research: nutrition, diabetes, and lipid metabolism;
Professor
Department of Medical Technology
University of Hawai‘i at Manoa
Biomed C-206
Honolulu, HI 96822
Tel: 808-956-8632, Fax: 808-956-9084; Email: andret@hawaii.edu;
GUANGYI WANG, PhD
Specialization/research: marine microbial bioengineering and biotechnology;
Associate Professor
Department of Oceanography
University of Hawai‘i at Manoa
Tel: 808-956-3744; Fax: 808-956-2336
Email: guangyi@hawaii.edu; http://www.soest.hawaii.edu/oceanography/faculty/wang.html

ANGEL YANAGIHARA, PhD
Specialization/research: biochemistry, peptide toxins;
Assistant Researcher
University of Hawai‘i at Manoa
Biomed A-204
Honolulu, HI 96822
Tel: 808-956-8328; Fax: 808-956-6984
Email: angel@pbrc.hawaii.edu; http://www.pbrc.hawaii.edu/bln/angel/

JINZENG YANG, PhD
Specialization/research: animal molecular biology and biotechnology;
Associate Professor
Department of Human Nutrition, Food, and Animal Sciences
University of Hawai‘i at Manoa
1955 East-West Road, Ag. Sci 216
Tel: 808-956-6073; Fax: 808-956-4024
Email: jinzeng@hawaii.edu; http://expertise.cos.com/cgi-bin/exp.cgi?id=1019320

JIAN YU, PhD
Specialization/research: bioengineering, marine bioproduct development;
Associate Professor
Hawaii Natural Energy Institute,
School of Ocean & Earth Science & Technology
University of Hawaii at Manoa, Honolulu, Hawaii, USA
Tel: 808-- 956-5873; Fax: 808-956-2336
Email: jianyu@hawaii.edu;
http://www.hnei.hawaii.edu/text/template.asp?userID=jianyu

Affiliate Graduate Faculty

HENRIK H. ALBERT, PhD
Specialization/research: Plant molecular biology and biotechnology;
Pioneer Hi-Bred, 700A Bay Road, Redwood City, CA 94063
Tel: 650-298-3354
Email: henrik.albert@pioneer.com

PAUL H. MOORE, PhD
Specialization/research: sugarcane biotechnology, plant molecular biology;
USDA ARS Tropical Plant Pathology, Physiology, & Production Unit
Hawaii Agriculture Research Center
99-193 Aiea Heights Dr., Aiea, HI 96701
Tel: 808-486-5411; Fax: 808-486-5020
Email: paul.moore@ars.usda.gov;

RAY MING, PhD
Specialization/research: plant molecular biology;
Department of Plant Biology
University of Illinois at Urbana-Champaign
1201 W. Gregory Drive, 288 ERML, MC-051
Urbana, IL 61801
Tel: 217-333-1221; Fax: 217-244-1336
Email: rming@life.uiuc.edu;

SHAUN MOSS, PhD
Specialization/research: aquaculture;
The Oceanic Institute
41-202 Kalanianaole Hwy
Waimanalo, HI 96795
Tel: 808-259-3110; Fax: 808-259-9762
Email: smoss@oceanicinstitute.org;

MINGLI WANG, PhD
Specialization/research: plant molecular biology;
Hawaii Agriculture Research Center
99-193 Aiea Heights Drive, Aiea, HI 96701
Tel: 808-486-5389; Fax: (808) 486-5020
Email: mwang@harc-hspa.com;

QINGYI YU, PhD
Specialization/research: plant molecular biology;
Hawaii Agriculture Research Center
99-193 Aiea Heights Drive, Aiea, HI 96701
Tel: 808-486-5374; Fax: (808) 486-5020
Email: qyu@harc-hspa.com;

JUDY ZHU, PhD
Specialization/research: plant transformation, biotechnology;
Hawaii Agriculture Research Center
99-193 Aiea Heights Drive, HI 96701
Tel: 808-486-5376; Fax: (808) 486-5020 Aiea HI 96701
Email: jzhu@harc-hspa.com