

# M R B NEWS

*Featured Faculty: Dr. Mario Rivera Professor; Chemistry*

## Academic Areas:

Bioanalytical and Bioinorganic Chemistry

## Research Interests

Structure-function relationships in heme containing proteins.

## Educational

### Background:

B.S., 1984, Universidad Autonoma de Guadalajara; Ph.D., 1991, University of Arizona; Postdoctoral Fellow, 1991—1994, University of Arizona



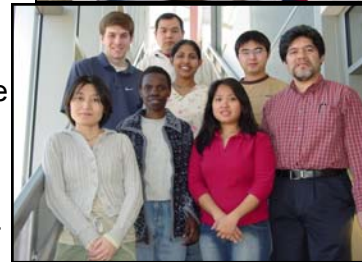
Photos: Mario Rivera and Rivera Chemistry Lab

Iron is an essential nutrient for most organisms. Pathogenic bacteria attempting to colonize an organism are confronted with extremely low concentrations of free iron. Consequently, many pathogens have evolved sophisticated mechanisms for iron acquisition, including the utilization of heme iron. Moreover, it has been recently shown that during the early stages of infection some bacteria prefer iron from heme. Thus, it is possible that targeting paths used by pathogenic bacteria to assimilate iron and heme-iron from their host is a viable approach to the development of new antibiotics.

Many of the proteins involved in heme uptake and heme utilization in the opportunistic pathogen *Pseudomonas aeruginosa* have designated functions. However, the structure, dynamics and inter-protein interactions that facilitate host-heme capture, internalization and degradation in the cytosol are largely unknown. Thus, the Rivera laboratory is working toward filling this gap by studying the structure, function, dynamics and association of soluble proteins that aid in the capture of heme from hemoglobin and help

degrade it in the cytosol of *P. aeruginosa*. The current approach to address these issues can be summed as follows: (1) Biochemical and structural characterization of previously unknown electron transport proteins (Bfd and Fpr), which we hypothesize function to deliver the 7 electrons needed by heme oxygenase to cleave the heme and release its iron in the cytosol of *P. aeruginosa*. NMR spectroscopic investigation of the protein-protein interactions that facilitate electron transfer from Bfd to heme oxygenase to support the degradation of heme is also an important component of these studies. (2) Structural characterization of HasAp, a secreted heme binding protein capable of capturing heme from hemoglobin and delivering it to the outer membrane receptor for internalization. Structural information of HasAp, in turn, will be used to study and define its interactions with hemoglobin. (3) Characterization of polypeptide dynamics in time-scales ranging from  $\mu$ s to s for proteins and enzymes implicated in heme iron acquisition. This information is expected to contribute to the understanding of catalytic function and inter-protein

interactions. In this context, NMR methods are currently being applied to study the dynamic behavior of heme oxygenase, which is currently the best understood enzyme in the path of heme iron acquisition.



**MEET THE GRAD STUDENT:**



**Name:** Karla Leslie  
**Lab Group:** Fowle/Roberts  
**Field of Study:** Biogeochemistry  
**Time at KU:** 8 Months  
**Hobbies:** Travel  
**Home Town:** Windsor, Ontario Canada

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**IMPORTANT BUILDING INFORMATION**

**If you have extra campus envelopes in your office/lab and would like to get rid of some please bring them to the front desk!**

**MRB Brown Bag Lecture Series**

We would like to begin a new lecture series here at MRB as a way for us to share research stories with one another. If anyone is interested in sharing their research findings, rehearse for another presentation, or just talk about specific research topics, please let us know. We'll have these in the 1<sup>st</sup> floor conference room over the lunch hour and attendees can bring brown bag lunches. We may come looking for volunteers!

**Spring Break is just around the corner. Please let us know who will be in your labs that week so we can contact the appropriate person(s) for packages and mail.**

**EHS Lab Signs**  
**Environmental Health and Safety has provided the chemical signs for your labs. If there are corrections/changes to the contact information, you can make those using the form on the EHS web site. A half-page can be inserted over the existing sign. If changes need to be made to the hazard section at the top of the page, please contact EHS, Ellen Kimmel at 4-2850.**

**CAMPUS MAIL:** The proper way to address campus mail is the person's name and their department. The campus mail office does not want the building and room number... just the department. MRB is the exception to this rule. Mail addressed to us should use MRB instead of the department.

**Housekeeping Issues**  
Please remember to follow EHS guidelines when disposing of sharps, broken glass, and/or hazardous material.

If you have a party or group gathering with food, please clean up any leftovers. If food is left out in the common areas or break rooms after hours, it will be thrown away.

It has gotten too expensive for MRB to provide coffee for the building. As a result, the coffee makers have been removed. (In order to keep the coffee maker, we have to buy products.) The espresso machine has been returned and is in the 1<sup>st</sup> floor break room. Espresso is \$ .35/shot.



Dr. Jim Roberts speaks to Congressional Delegates at MRB in regards to the importance and direction of research at The University of Kansas.

