Magnetotactic Bacteria Project takes MGA Students to Jekyll Island

The current focus of our magnetotactic bacteria project is to isolate and characterize magnetotactic species that we have detected in samples from several locations along the Georgia coast including the UGA Skidaway Institute and Jekyll Island. Magnetotactic bacteria are unique in their ability to use tiny internal magnetosomes to find a "sweet" spot in the water column (or sediment) where oxygen is low. Georgia salt marsh sediments have been well characterized with regards to their chemistry and prokaryotic ecology but no reports of magnetotactic bacteria have been recorded until now. Determining the role magnetotactic bacteria play in Georgia salt marsh sediments may provide a clearer picture of nutrient cycling in such an ecologically important but fragile habitat. In order to better describe the magnetotactic species present in the Georgia salt marsh, we are attempting to bring them into pure culture by crafting different media recipes based on the chemical composition of the salt marsh sediments and water.

In addition to determining the best growing conditions, we hope to also analyze DNA from the Georgia salt marsh isolates including rRNA and magnetosome genes to give us a better idea of their taxonomic position and similarity (or differences) to other species of magnetotactic bacteria. One of our main questions to answer is to determine if there is any biogeographic signal to regional isolates, i.e. can Georgia isolates be distinguished from isolates found in other parts of North America, Asia or Europe.

Because these bacteria have the unique physical property of magnetism supported by a unique metabolism, working on them allows for the integration of physics, chemistry and biology providing students participating in the project with a true multidisciplinary research opportunity plus a field component (collection of salt marsh sediments). There are three faculty working on this project: Dr. Sharon Standridge (microbiology), Dr. Estelle Nuckels (chemistry) and Mr. Ed Wallace (physics).

Undergraduates have played an important role in the research so far. Current culture work is being carried out by MGA students Carmen Thompson and Josiah Davis, with the assistance of Dr. Standridge and Dr. Nuckels. Seth Wheeler and Mr. Ed Wallace are working on measuring the magnetic moment of the Skidaway species using video analysis. Dr. Nuckels is also interested in studying the magnetosome proteins and the formation of magnetite using ab initio calculations. These calculations, with the magnetic moment experimental data collected by Mr. Wallace, will assist in the determination of the size and shape of the magnetite formed. The initial collection, detection and culture attempts of magnetotactic bacteria in the Jekyll and Skidaway samples was carried out last year (2013-2014) by former MGA students Lani Irvin, Brittany Davis and Marissa Barron to whom we are extremely grateful for all the time and effort that they gave to the hunt for Georgia's own magnetotactic bacteria.

(Author: Dr. Sharon Standridge)
New Faculty Appointments

Dr. Laura Dyer (Assistant Professor of Biology) has recently joined the faculty here in Natural Sciences. Dr. Dyer comes from the McAllister Heart Institute of the University of North Carolina at Chapel Hill, where her research focused on how the coronary arteries – the arteries that supply the heart with oxygen and nutrients – are formed. She has had two publications hit the press this semester, including “Connecting the coronaries: How the coronary plexus develops and is functionalized” in Developmental Biology and “Protein isolation from the developing embryonic mouse heart valve region” in the Journal of Visualized Experiments. Additionally, Dr. Dyer was invited to speak at the American Association of Anatomists Annual Meeting, which will be held at the Experimental Biology 2015 meeting, on her recent findings.

Dr. Jianwei Wang (Assistant Professor of Physics) joined the Natural Sciences faculty in the Fall of 2014. Dr. Wang has a PhD in Experimental Condensed Matter Physics from the Department of Physics and Astronomy of the University of Georgia (UGA) under Professor Richard S. Meltzer, Editor of the Journal of Luminescence. His research involved the studies of high pressure laser spectroscopies and thermally stimulated luminescence of solids doped with rare earth ions with the goal of developing new materials to improve the energy efficiency of mercury free fluorescent lamps and plasma displays. Since graduation he worked at the Center for Optical Sensors and Spectroscopies in the Department of Physics of the University of Alabama at Birmingham (UAB) as a Postdoctoral Associate and then a Research Associate on a research project directed by Professor Christopher M. Lawson, Executive Director of Alabama EPSCoR (www.ALEPSCoR.org). His research focused on the studies of nonlinear optical properties of metal-organic based materials to develop new optical power limiting materials for the applications in protecting the optical sensor and human eye from the damage of high power lasers. Dr. Wang has discovered several effective materials working in the blue spectral region (Inorganic Chemistry, 50 (2012) 2016 and 51 (2011) 2015).

Featured Alumni

Jane’ Probadora (2014, Biology B.S.)
Current Job: ESG (Environmental Service Group) Operations INC.
Brief job description: Analyze water and wastewater samples for the city of Warner Robins
What is the best part of your job? It is a good feeling to know that the work I do helps to ensure that not only does the public (city of Warner Robins) have clean water, but also that the water we put back into the stream systems have no negative effect on the biota.
Favorite memory from undergraduate? This topic is so hard because there are so many of them, but the absolute best was jamming out to music while working and joking with my lab partners in the Plant Bio Lab.

Mike Imlay (2012, Biology B.S.)
Current Job: ESG (Environmental Service Group) Operations INC.
Brief job description: Analyze water and wastewater samples for the city of Warner Robins.
What is the best part of your job? Working with awesome individuals that are concerned about the environment and the quality of the water produced for the citizens of Warner Robins.
Favorite memory from undergraduate? Going out to lake knee-deep with Dr. G’s research methods class and running experiments.
Advice to current students? There are many more careers in science than Medical and Pharmacy. Don’t be afraid to cultivate many interests even if they deviate from “the plan”.

2014 Faculty Tenure and Promotion

Dr. Christopher Hornung - promotion to Associate Professor of Engineering (2014)
Dr. Gerald Buffone - Tenure and promotion to Associate Professor of Chemistry and Biochemistry (2014)
Dr. Edwynn Wallace - Tenure Associate Professor of Physics (2014)