

## Department Update

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## Spring Phonathon

April 6-19, 22 2012

Your chance to update your contact info, share your thoughts and news, talk with current BioSci students, and contribute to the Biological Sciences department.

## Environmental Microbiology Lab Investigates Red Lake

One of the tasks that **Dr. Melanie Mormile** took on while on sabbatical at the University of Missouri-Columbia in 2010 was to find an extreme site in Missouri. **Dr. Mormile** studies extremophilic bacteria but usually retrieves them from places like Soap Lake in Washington State and Western Australia. So, finding a local extreme site was a challenge. However, she did not have to go very far from Columbia to find Red Lake. Red Lake is located in the Rocky Forks Conservation Area, a site of the former Peabody Coal Company. This conservation area has undergone restoration but Red Lake still receives acid mine drainage. The photo of the lake shows a seep that feeds into the lake. The red coloration is iron precipitating out of solution and the pH of the water is about 2.9. The pH of the lake tends to be around 3.7. In addition to the low pH and abundant iron, there are many metals present here, too. An extreme site in Missouri was found!

The acidophilic bacteria present in Red Lake are interesting to **Dr. Mormile** for two reasons. The first reason is that plenty of biomass, leaves and twigs, fall into the lake. This biomass does not buildup overtime and thus must be undergoing biodegradation. The bacteria that are present must have enzymes that can breakdown the lignin and cellulose components present. These acidophilic enzymes possess the capability of breaking down biomass and can subsequently be used for the production of biofuels. **Mormile** and her host at Mizzou, Dr. Gary Stacey, were awarded a Mizzou Advantage grant to retrieve these useful enzymes. Currently, Elise Kittrell, a Master's student in Environmental Engineering who is co-advised by **Mormile** and Dr. Joel Burken, is trying to obtain pure cultures of acidophilic bacteria. **Erica McFarland**, an undergraduate researcher in Mormile's lab, is working with Elise. It is anticipated that **Erica** will have her own acidophilic bacteria to characterize. **Mormile** is continuing to work with Stacey to perform metagenomic analysis on DNA isolated from the lake sediments. The metagenomic analysis will provide **Mormile** and Stacey with information on the microbial populations present as well information on the metabolic capabilities of these organisms. If successful, **Mormile** and her students will be able to develop enzymes from genes



Acid mine drainage into Red Lake, located north of Columbia, MO at the former Peabody Coal Mine.

retrieved from the lake's sediments. These enzymes could provide a means of less expensive biofuel production.

The second reason why both **Mormile** and Burken are studying the lake is to understand the iron and sulfur cycling that is occurring here. The iron and sulfur contribute to the acidic and extreme conditions of the lake. However, unexpected living creatures have been found, such as spiders and frogs. **Mormile** and Burken are interested in determining what is moderating the conditions. Elise is studying the anaerobic sulfur and iron cycling to help understand how to control the production of acidity and release of the metals into the lake. Once these cycles are understood, this knowledge can possibly be applied to other acid-mine drainage sites to control the negative inputs into these systems.

Red Lake has attracted the attention of others. **Dr. Dev Niyogi** and his students, **Kele Thraikill** (Master's) and **Amber Kreps** (Undergraduate), are identifying and studying the activities of the fungi in this lake. Dr. Dave Wronkiewicz, Geological Sciences, is also working with **Mormile** and **Niyogi** in determining the chemical parameters, such as the metal content, of the lake. The person who introduced the lake to Mormile is Dr. Cheryl Kelley, a Geologist at Mizzou. Dr. Kelley is also interested in the iron and sulfur cycling in this lake. All involved are looking forward to continuing collaboration on studying this interesting and extreme site in Missouri!

# Department Update

The S&T BioSci community provides a supportive, collegial, challenging and rewarding environment for its faculty, students and staff. We faced some considerable challenges in the coming year, but we will maintain a consistent focus on preserving and enhancing the quality of our programs.

**Faculty:** Three BioSci faculty were honored with Faculty Achievement Awards in February: **Dr. Ronald Frank** received a Faculty Teaching Award, **Dr. David Westenberg** received a Faculty Service Award, and **Dr. Katie Shannon** received a Service Learning Award. **Ms. Terry Wilson, M.S.**, was appointed as a Teaching Associate Professor. **Ms. Wilson** has won numerous teaching awards, and received a Faculty Achievement Award in February 2011. **Ms. Wilson** teaches Biodiversity and lab, Principles of Biology, Cellular Biology lab, and General Biology and lab. **Ms. Wilson** is now assistant state coordinator for the Project Lead The Way program, and shares PRO advising for first year students with **Dr. Frank**.

**Students:** Degrees were awarded to 35 undergraduates and 8 graduate students at our 2011 May and December commencement ceremonies. This brings the number of BioSci graduates to 532 since the department was formed in 1978. More than 32% of all biology majors (173) have graduated in the last 5 academic years, reflecting the recent growth of the department. The BioSci community now includes 219 undergraduates (compared to 181 last year). In terms of enrollment, we are now the 6th largest department on campus (up from 7th last year). This growth counters trends in Missouri demographics; the number of students graduating from Missouri high schools is dropping, and will continue to drop for the next 4 years. I attribute our growth to two factors: 1) we have a very good program and 2) people are starting to realize that we have a really good program. The recognition of our programs is the results of consistent and extensive recruitment efforts and a growing cadre of ambassadors – our appreciative graduates.

**Department/University Finances:** We have weathered repeated cuts in state funding, and the governor's proposal for fiscal year 2013 calls for a 12.5% decrease in funding (state funding accounts about 27% of our operating budget). The proposed decrease at S&T would be \$4.5 – 5.0 million and return us to 1996 funding levels. Cuts of this magnitude will indeed be painful. Thus, it is likely that we are facing substantial tuition increases, increased student-faculty ratios, and an increase in the number of unfilled faculty populations. On the bright side, BioSci can point to its growth of student population, an increased alumni population, increased donations, endowment growth, and increased income from biotech sales, summer courses, PLTW and continuing education fees. One particularly pressing need is to secure continuing support for our research efforts. In response to this situation, we have created faculty research accounts funded with income from a variety of activities that can supplement general operating income (clone sales, certain educational fees, restricted gifts and endowment income). The economy will eventually improve, and I promise that we will retain our intense focus on maintaining the quality of our programs.

**Research:** BioSci faculty members published 18 peer reviewed research publications, presented 22 papers at national and international meetings, and were invited to give 19 talks in various professional venues. **Dr. Melanie Mormile** and her colleagues were awarded a patent for the invention Fossil Fuel-Free Process of Lignocellulosic Pretreatment with Biological Hydrogen Production. Six visiting scholars from Taiwan National Normal University spent part of 2011 in our department; five others will join us later in the spring semester 2012. Clones sales from the cDNA Resource Center increased 13% from \$211,688 in FY2010 to \$240,219 in FY2011, and have totaled \$1.9 million since FY2005. The sequences of 44 receptor signaling proteins were submitted to GenBank, and 38 clones were introduced to the collection and made available to the scientific community. Research expenditures from extramural sources amounted to \$437,070 in 2011.

**Strategic Plan:** Among the strategic plan goals receiving particular attention at our most recent retreat (August 2011) were 1) defining curriculum learning objectives, 2) engaging our first year students, 3) securing research equipment, notably a cell sorter and confocal microscope, 4) increasing scientific publication, 5) improving departmental communications, 6) developing a doctoral training program, 7) increasing faculty research/development funding from internal sources by at least \$1,000/year, and 8) strengthening funding streams from PLTW activity, summer teaching, donations, and endowments.

I am pleased to provide you with this update. Many further details on our activities are available in our recently published Annual Report which can be accessed on line at the BioSci web site. <http://biosci.mst.edu/documents/AnnualReport2011.PDF> Your comments and suggestions are welcome. As always, I invite you to visit the department for a tour and update on our work.



Robert S. Aronstam, Ph.D.  
Professor and Chair, Biological Sciences

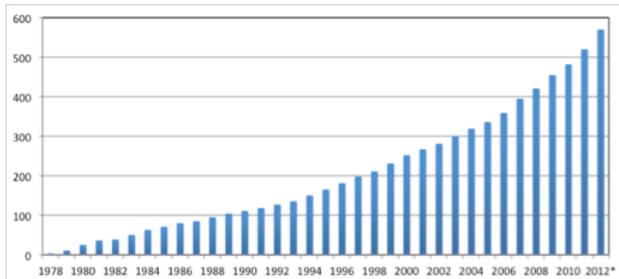


2011 Biological Sciences Staff from left to right: Vicky Rowden, Connie Behrick, and Jessica Pelc

## 2011 Research Partners

We are pleased to acknowledge those who generously supported the department in 2011. The consistent support we receive from our alumni and friends provides the means to strengthen our academic community and support innovation in both teaching and research. A record amount of \$23,015 was received in 2011. Contributions are welcome at any time and can be made on the S&T web site ([givingtomst.missouri.edu](http://givingtomst.missouri.edu))

We appreciate all you have done to support the department and its students and hope you will continue to be able to do so. We welcome your feedback on any of our activities or plans, and invite you to visit the department any time you are in Rolla.



The growing population of BioSci alumni (\*2012 estimated).

### Donations up to \$100

Meghan Ruth Donnelian  
Susan Nickols  
Christina and Richard Schmidt  
Cynthia and Jeffrey Fischer  
Dr. George W. Karr  
Dr. Julie and John Stanfield  
Julie Sellmeyer Townsend  
Peggy and David Borrok  
Lisa and Stanley Lindesmith  
Marcie Lanette & Brad Alan Rucker  
Jennifer L Jacobi

### Donations of \$100 to \$499

Herman Armstrong  
Carol A. Bain  
Matthew and Amy Banks  
Denise M. Denner  
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Hal Stover & Kerstien Andrea Padget  
April Rocha  
Lisa Kay Schipper

Matthew F.Vogel  
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Dr. Anthony and Julie Kaczmarek  
Ashley Jo Sheek  
Dr. David E. Schlarman  
Betsy Marie Dampier  
Dr. Paul Robert Stricker

### Donations of \$500 to \$999

Dr. James Francis Flechtl

### Donations > 1,000

Robert & Joan Aronstam  
Joseph Safron

### Matching Gifts

Monsanto Fund - Marcie Lanette Rucker  
Monsanto Fund - Ann Schumer  
Baxter Int'l Foundation - Joseph Safron  
Exxon Mobil Foundation - Phillip S. Fedderman  
Exxon Mobil Foundation - Marcus H. Hayer

### Gifts in Kind

Thomas A. and Mary Lynn Formanack

## Bio Sci Faculty Receive Awards at Reception on February 7th

**Dr. Katie Shannon** received the 2012 Faculty Service Learning Award. **Dr. Shannon** has organized and mentored Bio310 as a service learning course for the last three years. In this capstone course, students work in groups to propose, develop, and implement a service project related to the biological sciences. Course objectives are to develop students' organization, leadership, and teamwork skills while enhancing their sense of community responsibility. **Dr. Shannon's** role in the course is to give advice and support to student groups as they design and implement their projects, and to evaluate their performance based on group oral and written presentations.



Dr. Shannon receives her award from interim Chancellor Dr. Wray



Dr. Westenber receives his award from interim Chancellor Dr. Wray

**Dr. David Westenber** received a 2012 Faculty Award for Outstanding Service. **Dr. Westenber** serves the department and institution in numerous capacities. **Dr. Westenber** serves as chair of the Health Professions Committee, and serves as advisor to Scrubs, the student organization for students interested in the health professions. **Dr. Westenber** also serves as co-advisor to Helix, the biology student organization, and iGEM (International Genetically Engineered Machine). Within the department, **Dr. Westenber** organizes the seminar program, chairs the student award committee, and serves on multiple departmental committees.

# Faculty News

## Faculty Publications, 2011

Begemann, M.B., **M.R. Mormile**, **V.G. Paul**, and D.J. Vidt. Potential Enhancement of Biofuel Production Through Enzymatic Biomass Degradation Activity and Biodiesel Production by Halophilic Microorganisms. In A. Ventosa, A. Oren, and Y. Ma (eds), *Halophiles and Hypersaline Environments: Current Research and Future Trends*. Springer-Verlag, Berlin, Heidelberg, Germany, 2011, p. 341-357.

Brown, S.D., M.B. Begemann, **M.R. Mormile**, J.D. Wall, C.S. Han, L.A. Goodwin, S. Pitluck, M.L. Land, L.J. Hauser, and D.A. Elias. Complete genome sequence of the haloalkaliphilic, hydrogen producing Halanaerobium hydrogenoformans. *Journal of Bacteriology*, 193: 3682-3683.

Donlea, J.M., **M.S. Thimgan**, Y. Suzuki, L. Gottschalk, and P.J. Shaw. Inducing sleep by remote control facilitates memory consolidation in *Drosophila*. *Science*. Jun 24;332(6037):1571-6, 2011.

Findley, S.D., **M.R. Mormile**, A. Sommer-Hurley, X.-C. Zhang, P. Tipton, K. Arnett, J.H. Porter, M. Kerley, and G. Stacey. Activity-based metagenomic screening and biochemical characterization of bovine rumen protozoan glycosyl hydrolases. *Applied and Environmental Microbiology*, 77: 8106-8113.

Fu, H., M.N. Rahaman, D.E. Day, and **R.F. Brown**. Hollow hydroxyapatite microspheres as a device for controlled delivery of proteins. *J Mater Sci: Mater Med* 22:579-91, 2011.

Fumeaux, C., N. Bakkou, J. Kopcińska, W. Golinowski, **D.J. Westenberg**, P. Müller, and X. Perret. Functional analysis of the *nifQdc-tA1y4vGHJ* operon of *Sinorhizobium fredii* strain NGR234 using a transposon with a *NifA*-dependent read-out promoter. *Microbiology* 157::2745-58, 2011.

Greenwood, M.J., J.S. Harding, **D.K. Niyogi**, and A.R. McIntosh. Improving the effectiveness of riparian management for aquatic invertebrates in a degraded agricultural landscape: stream size and land-use legacies. *Journal of Applied Ecology*. doi: 10.1111/j.1365-2664.2011.02092.x, 2011.

Hein, A., **C. Hou**, and J.F. Gillooly. Energetic and biomechanical constraints on animal migration distance. *Ecology Letters*. doi: 10.1111/j.1461-0248.2011.01714.x, 2011.

**Hou, C.** and M. Mayo. Pulmonary diffusional screening and the scaling laws of mammalian metabolic rates. *Physical Review E*. 84:61915. doi: 10.1103/PhysRevE.84.061915, 2011.

**Hou, C.**, K. Bolt, and A. Bergman. A general life history theory for effects of caloric restriction on health maintenance. *BMC Systems Biology* 5:78. doi:10.1186/1752-0509-5-78, 2011.

**Hou, C.**, K. Bolt, and A. Bergman. A general model for ontogenetic growth under food restriction. *Proc. R. Soc. B*. doi: 10.1098/rspb.2011.0047, 2011.

**Hou, C.**, K. Bolt, and A. Bergman. Energetic basis of correlation between catch-up growth, health maintenance and aging. *J. Gerontol. A Biol. Sci.* doi: 10.1093/geronol/66/10/1027, 2011.

Kolan, K.C.R., M.C. Leu, G.E. Hilmas, **R.F. Brown** and M. Velez. Fabrication of 13-93 bioactive glass scaffolds for bone tissue engineering using indirect selective laser sintering. *Biofabrication*, 3:1-10, 2011.

Lee C.-Y., J.-F. Li, J.-S. Liou, Y.-C. Chang, **Y.-W. Huang**, and H.-J. Lee. A gene delivery system mediated by both a cell-penetrating peptide and a PiggBac transposase into human cells. *Biomaterials* 32:6264-6276, 2011.

Lee L, Leopold JL, **Frank RL**. Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings. Proceedings of the IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB) 2011, 7-14, 2011.

Liu BR, **Y.-W. Huang**, J.G. Winiarz, H.-J. Chiang, H.-J. Lee. Intracellular delivery of quantum dots mediated by histidine- and arginine-rich HR9 cell-penetrating peptides through the direct membrane translocation mechanism. *Biomaterials* 32:3520-3537, 2011

**Shannon, K.B.** IQGAP family members in yeast, *Dictyostelium*, and mammalian cells. *International Journal of Cell Biology Focus Issue on Cytoskeletal Proteins* (in press, 2011)

**Thimgan, M.S.**, S.P. Duntley, and P.J. Shaw. Changes in Gene Expression with Sleep. *Journal of Clinical Sleep Medicine*. Oct 15;7(5 Suppl):S26-7, 2011.

Zuo, W., M.E. Moses, G.B. West, **C. Hou**, and J.H. Brown. A general model for effects of temperature on ectotherm ontogenetic growth and development. *Proc. R. Soc. B*. doi:10.1098/rspb.2011.2000, 2011.

## Invited Talks and Seminars, 2011

**Aronstam, R.S.**, Department of Biological Sciences, "Influence of oxidative stress on muscarinic receptor signal transduction. Update on cDNA Resource Center operations", Rolla, MO, September, 2011.

**Aronstam, R.S.**, National Cheng Kung University, "Characterization of muscarinic receptor-mediated signal transduction", Department of Life Sciences, Tainan, Taiwan, June 28, 2011.

**Aronstam, R.S.**, National Dong Hwa University, "Crosstalk in neurotransmitter signaling pathways: S&T and Taiwan scholar exchange program", Hualien, Taiwan, June 24, 2011.

**Aronstam, R.S.**, National Taiwan Normal University, "Disruption of muscarinic signal transduction by oxidative stress: Nanoparticles, honokiol and calcium", Department of Life Sciences, Taipei, Taiwan, June 22, 2011.

**Aronstam, R.S.**, Tzu Chi University, "Muscarinic receptor-mediated signaling pathways", Hualien, Taiwan, June 24, 2011.

**Hou, C.**, Energy uptake, allocation and tradeoffs during growth. Colloquium seminar, China Agriculture University, Beijing, China, Feb, 2011.

**Huang, Y.-W.**, Academia Sinica, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry, Taipei, Taiwan, July 5, 2011.

**Huang, Y.-W.**, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry National Cheng Kung University, Tainan, Taiwan, June 28, 2011.

**Huang, Y.-W.**, Cell-Penetrating Peptide Mediated Delivery of Nanomaterials: Routes of Cell Entry. National Taiwan Normal University, Taipei, Taiwan, June 22, 2011.

**Huang, Y.-W.**, Cell-Penetrating Peptides and Fluorescent Nanomaterials as a Versatile Nanocarrier System, University of Missouri-Columbia, Columbia, MO, USA. Nov 29, 2011.

**Huang, Y.-W.**, Nanobiotechnology, Missouri S&T Department of Chemical and Biological Engineering, Rolla, MO, USA, Feb. 24, 2011.

**Huang, Y.-W.**, Non-metal vs. Metal Oxide Nanoparticles: Roles in ROS-Induced Toxicity, National Dong Hwa University, Hualien, Taiwan, June 24, 2011.

**Mormile, M.R.**, A Focus on the Environmental Microbiology of Soap Lake, Washington and Its Extremophilic Inhabitants. College of Science, Washington State University. Pullman, Richland (Telecast), and Vancouver (Telecast), Washington, April 15, 2011.

**Mormile, M.R.**, Are there Martians in Australia? Institute for Microbial Biotechnology and Metagenomics, Department of Biotechnology, University of the Western Cape, Cape Town, South Africa, June 29, 2011.

**Shannon, K.B.**, Choosing a Career Focused on Teaching and Research. Keynote speaker at Graduate Student Retreat, Biochemistry and Biophysics Graduate Program at Washington University, Cedar Creek Conference Center, 2011.

**Shannon, K.B.**, Using Budding Yeast To Study The Regulation Of Cytokinesis, Department of Molecular Microbiology and Immunology, University of Missouri-Columbia, 2011.

**Thimgan, M.S.**, Disruption of peripheral lipid metabolism genes alters the response to sleep deprivation, Missouri University of Science & Technology, 2011.



Biological Sciences Faculty 2010 From left to right-front row, Dev Niyogi, Katie Shannon, second row, Melanie Mormile, Terry Wilson, Matt Thimgan, Robert Aronstam, Chen Hou, third row, Dave Westenberg, Ron Frank, Yue-wern Huang

# Biological Sciences Student News

## iGEM Team Receives Silver Medal, Becomes Official Design Team

iGEM is the International Genetically Engineered Machines team. The goal of synthetic biology is to use genetic engineering techniques to produce biological “machines.” For their project, the students designed a DNA “device” that allows the bacteria - a non-virulent strain of *E. coli* - to sense the presence of the simple sugar glucose. The bacteria emit a yellow glow when glucose is present. As glucose concentrations become higher, the glow becomes brighter.

The team developed the system as part of an annual competition sponsored by iGEM, the Americas Regional Jamboree, held Oct. 8-10, 2011, in Indianapolis. S&T’s iGEM chapter received a silver medal for their effort.

iGEM is now officially a member of the Student Design and Experiential Learning Center (SDELCC), the first non-engineering group to be a part of the center. [http://2011.igem.org/Team:Missouri\\_Miners](http://2011.igem.org/Team:Missouri_Miners)



iGEM members Avery Joseph, Erica Shannon, and David Pohlman inspect bacterial cultures in the lab.

## Biological Sciences Students Volunteered in Joplin



Jordan Bridges, Megan Koerner, Alexis Martin volunteered with Extreme Home Makeover

On May 22nd, 2011 a F5 tornado struck the city of Joplin, MO. The tornado killed over 150 people and destroyed over 2,000 buildings. To aid with rebuilding, volunteer trips to Joplin were organized by Biological Sciences students in the Senior Seminar class in partnership with Helix. Two trips to Joplin were organized, on October 21st -22nd and November 11th-13th. During the trips students worked with AmeriCorps, Extreme Makeover: Home Edition, and Habitat for Humanity. Over 70 S&T students cleared debris, moved residents into new homes, assisted with land and tree clean up, landscaping, paperwork, demolitions, painting, and flooring, and helped to build 17 homes. Students from Biological Sciences who participated were Grace Bay, Jordan Bridges, Andrew Bromet, Shelby Emmett, Kristin Kelly, Megan Koerner, Alexis Martin, Megan Ottomeyer, and Tara Waybrant. According to surveys of volunteers conducted by the senior seminar group, students were inspired by the experience and inspired to volunteer again in the future.

## December 2011 Graduates

Thirteen Missouri S&T students received a B.A. or B.S. and three received an M.S. in Biological Sciences during the Dec. 2011 Missouri S&T Commencement ceremony.



From left to right: Suzanne Simpson, Elizabeth Keehn, Tiara Brown-Crosen, Mindy Merenghi, Whitney Cowen, Dr. Aronstam, Ann Caudill, Brian Haslag, Matt Keppler, Rob Kayser, Adrienne Angelos, Rich Watters

## Graduate Student News

One Graduate Student received a M.S. in Biological Sciences this December.

**APRIL ROCHA'S**-Thesis title was “Isolation and Characterization of Bacteria Symbionts from *Crotalaria spectabilis* Grown on TCE Contaminated Soil”

## New Genetics and Behavioral Sleep Laboratory in the Biological Sciences Department



From left to right: lab members Christie Koch, Dillon Barton, Lindsey Schobert, Karen Schilli, and Carlos Rivera.

Why do we sleep?...Why can't I fall asleep?...Why do I feel so bad if I don't sleep? These are the types of questions being addressed by the new Genetics and Behavioral Sleep Laboratory in the Biological Sciences Department. Millions of Americans suffer from insufficient sleep, either by choice or by circumstance. This new lab uses the power of fruit fly genetics to identify the genes that govern sleep and wake regulation, how they might change with age, and potential targets for an intervention to help people cope with the consequences of sleep deprivation. "The fruit fly is an outstanding organism to address the genetic contributions to the regulation of sleep and wakefulness. Not only do they sleep at night, but they have many homologous pathways so that we might quickly discover novel therapies for humans" says lab director **Dr. Matt Thimgan**.

Past work by **Dr. Thimgan** has identified a novel pathway that influences sleep regulation, lipid metabolism. The first evidence that lipid metabolism genes may play a role in sleep regulation came from a gene that helps store and release fat.

When mutated this gene allows the fly not to be sleepy and allows the fly to learn after sleep deprivation. Two undergraduates, **Christie Koch & Thomas Congdon**, are now working on a novel gene that is predicted to be in that same pathway. Our lab has found that mutations in this gene disrupt sleep, now **Thomas** and **Christie** will determine whether the mutation is beneficial or detrimental.

The lab is also attempting to identify novel genes involved in sleep regulation. As we age, our sleep tends to degrade. Graduate student **Karen Schilli** and undergraduate students **Lindsey Schobert, Carlos Rivera, and Dillon Barton** are taking various strategies, including mutagenesis studies, developing a novel paradigm to increase anxiety in the flies, and evaluating other conserved pathways to understand how the body regulates sleep and wake cycles as well as how the body is restored during sleep. "The identification of new targets in sleep regulation is very exciting and quite important in finding a way to potentially help millions of Americans who struggle with sleeplessness," says **Karen**.

Not only does the lab focus on sleep regulation, but also how a lack of sleep impacts the health and quality of life. Emerging evidence is demonstrating that our metabolism is changed by a lack of sleep. Undergraduates **Stephanie Voertman, Thomas Hilderbrand, and Carlos Rivera** are determining whether these same effects occur in the fly. Since sleep contributes to diseases such as obesity and Type II Diabetes in humans, we can use the fruit fly to identify the underlying causes of these consequences and find a way to mitigate these deleterious outcomes in the face of sleep loss.

"I want to stress that getting the proper amount of sleep is critical to one's health and quality of life. But under circumstances in which you can't, this great group of students is working with each other and very hard to find a way to help," says **Dr. Thimgan**.