Expanding Science Research Opportunities in France for Appalachian Students

Final Project Report

Submitted to:

French Embassy to the United States

Mission for Culture & Universities in the United States
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Submitted by:

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Project Goals

Appalachian State University (Appalachian) and the University of Angers (Angers) have jointly developed and initiated a project focused on overcoming the barriers that STEM majors (Science, Technology, Engineering, and Mathematics) face when considering a study abroad experience. Our goals were:

- To use funds from the Transatlantic Friendship and Mobility Initiative to leverage institutional commitment to increasing the number of STEM majors who choose to study abroad.
- To deepen the existing partnership between Angers and Appalachian, specifically by increasing the number of joint STEM research projects between our universities.
- To overcome barriers that STEM faculty face when considering involvement with education abroad experience for students.

These goals were achieved by increasing the number of science and engineering students who conduct research in France at Angers, specifically by integrating undergraduate students at Appalachian in research experiences in the sciences with faculty at Angers. This project also allowed us to detail logistics of student research exchanges so as to streamline future research exchanges between Appalachian and Angers, which would remove barriers to potential long-term mentoring.

Project Description

Funding

The requested funds from the Transatlantic Friendship and Mobility Initiative subsidized expenses for 10 Appalachian students to conduct research in Angers, France, during Appalachian's first summer session, May 24 – July 1, 2016. Each student received $1,500 from the TIMI award. Matching funds of $1,000 per student were provided by the Appalachian's Office of International Education and Development, for a total of $2,500. Funds were transferred to each student's student account at Appalachian as "scholarship funds" for Summer 1 by the time of departure and issued as refunds for expenses already incurred by that date. Students were required to have direct deposit on file with the university. The College of Arts and Sciences at Appalachian also contributed funds for the Appalachian faculty stipends at a rate of 2.67% of their base salary per credit hour taught in summer. The TIMI grant covered faculty travel expenses.

Total costs for the students were estimated prior to student selection based on projected rates for airfare, ground transportation, housing, meal plan, summer tuition, and other miscellaneous fees and expenses (e.g. costs for obtaining a passport and visa, etc.). See attachment 1. Costs to students (and to Appalachian faculty traveling with them) were projected at this time in order to inform selected students as early as possible of the anticipated gap between funds provided and total costs to them, such that they can make informed decisions when accepting the offer and making plans.

Student recruitment and enrollment

Administrative representatives solicited faculty in the sciences and engineering at Angers to participate in the program to act as hosts to Appalachian students. Seven Angers faculty responded (see table 1) within 14 days and each provided a summary of the work that students would perform while at Angers. The program overview, which included the detailed work summaries provided by Angers faculty, were advertised on Appalachian's campus via the Office of Education Abroad and Development (OIED) website (https://international.appstate.edu/about/internationalizing-appalachian/stem-research-abroad), as well as postings to Appalachian LISTSERVs and email announcements to STEM departmental chairs and program directors for distribution to their students. Students wishing to participate in the program completed an on-line application form (see attachment 2) on which they had to provide contact information, a curriculum vitae, a transcript, a personal statement, and a ranking of their top two choices for areas of research while at Angers. They also had to provide letters of recommendation from Appalachian faculty in support of their application. Drs. Coffey and Thaxton, along with input from the Angers host faculty, selected and placed individuals into their work assignments. Selection was based on merit and probability of success in each laboratory. Applications were due January 15, 2016 and final selections were made and announced by January 30, 2016.

Once selected, students enrolled in a course at Appalachian, which was necessary to (1) provide academic credit for the students toward satisfaction of their degree requirements, (2) provide an administrative device with which Appalachian faculty could receive stipends for their efforts, and (3) to enable the students to receive full institutional support during their time at Angers, including services by OEID and university insurance. Drs. Coffey and Thaxton worked with the chairs of each student's home department to create a 1-hour special topics course (e.g. PHY 1560-145). Students were responsible for paying tuition and fees related to the course.

Preparatory Logistics

Once selected, students began several processes in preparation for their experience. OIED offered assistance to arrange air travel via a travel agency (students paid the travel agent themselves), although students were free to make their own travel arrangements. OIED also worked with Angers to set up housing and meal plans options for the students – student were responsible for working with Angers directly to secure housing and meal plans. Students also had the option to obtain housing on their own. Previous student interns provided advice.

Students and faculty completed paperwork as required by Appalachian's OIED office - see (https://international.appstate.edu/faculty-staff-resources/faculty-led-program-resources) and (https://international.appstate.edu/sites/international.appstate.edu/files/507programleaderhandbook_08282015.pdf).

In addition to posted emails from OIED and Drs. Coffey and Thaxton (via stemresearchabroad@appstate.edu), with details of logistic expectations and deadlines, a Facebook social media account was created with this information. The Facebook account was also a "fall back" communications platform during travel and during the research experience. Drs. Coffey and Thaxton established an "ASULearn" site for the cohort that served as a platform for Appalachian faculty and administrators to post information and announcements, and for student to link to weekly Google "Hangout" sessions and upload blog entries and their final reports.

Upon arrival in Angers, Drs. Coffey and Thaxton, accompanied by Angers international administrators, met with each student and their advisor to discuss schedules and expectations, and to ease the transition for the students. It also served to "put a face to a name" for future dialog. Table 1 outlines the student assignments, with the start time and location of the first introductory meeting.

Table 1: Student-mentor list

Student	Mentor	Start time - location
Sergei Miles	Eric Delabaere	18MAY, 2.00pm, LAREMA lab
Andrew Murray	Maxime Fleury	17MAY, 10am, GEIHP lab (CHU)
Nicholas Stover	Paul Richard	17MAY, 2.00pm, LARIS lab (ISTIA)
Jacob Harris	Paul Richard	17MAY, 2.00pm, LARIS lab (ISTIA)
Daniel Govert	Frans Jorissen	19MAY, 10.00am, LPG-BIAF lab, Geology
Bonnie Nguyen	Helene Howa	19MAY, 10.00am, LPG-BIAF lab, Geology
Katie vanEtten	Emmanuelle Geslin	19MAY, 10.00am, LPG-BIAF lab, Geology
Julia Hinds	Victor Teboul	18MAY, 3.30 pm, LPHIA lab
Sam Migirditch	Victor Teboul	18MAY, 3.30 pm, LPHIA lab
Sierra Milosh	Victor Teboul	18MAY, 3.30 pm, LPHIA lab

Student Management Plan During Internships

During their internships at Angers, students were expected to, on a weekly basis:

- Work ~40 hours per week – at the discretion of mentor;
- Create a blog entry on the course ASULearn site that included a summary of professional and personal activities, along with pictures;
- "Call in" to a Google "Hangout" session with Dr. Thaxton and their fellow students.

At the end of the project, the students were required to complete a 3-5 page summary of their internship experience that included a project description, their role in the project, what value this experience brought to them personally and professionally, and what could be done better/differently. Students and faculty mentors also were asked to participate in an end-of-project online survey.

Student Journals

Students were required to maintain weekly entries in an on-line journal. These entries were in addition to the weekly "Google Hangouts" sessions with Dr. Thaxton (usually on Friday or Wednesday). Excerpts are provided below.

By Dan Govert, - Friday, 3 June 2016, 9:05 AM:

> When I first arrived in France, most of you know that I had nearly $2,500 worth of research equipment stolen from me in Paris including my laptop, geology field book, pencils, paper, calculators, planner, notebooks, etc. as well as personal items such as my glasses, Amazon Kindle, necklace, raincoat, headphones, chargers, umbrella, and outlet converter :-). Afterwards, I was very tempted to get right back on the plane and fly right back to the United States. I was essentially a homeless man with a few sets of clothes. However, I decided to stay and pull through because an opportunity of participating in an internship in France does not come around too often. The beautiful city of Angers (shown below) did bring some peace and sanity back to me. Of course it wasn't just the beauty of Angers that helped me get through this struggle. Meeting the other interns of the STEM group as well as the lab partners within the science building were very supportive.

By Andrew Murray - Friday, 10 June 2016, 4:27 AM:

> This week mainly involved more attempts to find a bacterial colony containing the desired plasmid, which has so far been unsuccessful. The previous procedure involved ligating the desired DNA fragment onto a DNA fragment conferring ampicillin resistance. This means that the colonies either must contain the ampicillin resistance gene

or the ampicillin resistance gene ligated onto the gene of interest. The only way to tell the difference in the plasmid contained within the bacteria is to extract the DNA, digest it with restriction enzymes, and run it on a gel to determine the size fragments. A gel lane containing the expected fragment for a plasmid with both the ampicillin resistance gene and the gene of interest will confirm the existence of that gene within the bacteria colony. Unfortunately, up until this point I have only found fragments with the ampicillin resistance gene. Adding to the problems is the fact that my bacterial growth medium became contaminated with a fungus yesterday. This means that my sterile protocol was flawed, and I allowed some spores to get into the media. It is definitely something I need to improve on, as I cannot afford more delays caused by sloppy execution.

This Wednesday I also went with the rest of the STEM research abroad group to visit a castle and wine distillery in the country side. Both were very pleasant, and I really enjoyed the extensive network of tunnels that existed underneath the castle.

By Bonnie Nguyen - Friday, 17 June 2016, 8:26 AM:

I had quite an eventful weekend to start the last week of the program. This past weekend I was able to go biking/camping with Dan, Kati, and my French friend Leo. We started our adventure by taking a blablacar to Tours, where Leo is from, and we spent the night at his house. Him and his father made a spectacular dinner for us-- a whole oven baked chicken, that was given to Leo's dad by a local farmer and friend. We ate this along with french fries, with drinks and wine, and Haagan dazs ice cream for dessert. The next day we got up early, had a quick breakfast, and headed to the bike shop in Tours and rented some touring/road bikes for the weekend.

By Jacob Harris - Friday, 24 June 2016, 10:16 AM:

This week has been non-stop coding. With the 3D office model finished and imported into the larger Unity project, all the goals have been tweaking the programming. I've managed to make the virtual computers interactable such that, when clicked on, they bring up a GUI with an editable text box and allow for the addition of an image. Now, in the last couple days, I've been trying to see what I can finish up with programming a Start and Paus menu. It's been quite difficult, but I'm happy with what I've accomplished. The next couple weeks will certainly be fun. Next week is a trip to Barcelona and the week after, leading right up to the flight home, is several days in Paris. I'm not quite ready to go home, but I definitely know I'll be back in Europe soon. Donc, je vous remercie, Angers et je dit "au revoir" et "à plus tard"! Reste beau!

Student Reports

The students were required to complete a 3-5 page summary of their internship experience that included a project description, their role in the project, what value this experience brought to them personally and professionally, and what could be done better/differently. A condensed compilation of their reports are attached at the end of this report.

Post-Project Evaluation

Post-project evaluation included surveys sent out to the students and to the U. Angers faculty hosts. Drs. Coffey and Thaxton, informed by the student and Angers faculty survey responses, input from student weekly “Hangout” session, blogs, and final reports, and informal input from Appalachian and Angers administrators and faculty, compiled a list of improvements to be implemented in the next cycle.

Student Evaluations

The student survey focused on three areas of interest: The research environment, the living environment, and program administration. The responses were limited to “Strongly agree”, ”Agree”, “Neither agree nor disagree”, “Disagree”, and ”Strongly disagree”. Each responses was weighted as a 5, 4, 3, 2, or 1, respectively and a weighted average was obtained and reported herein – see table 1 and figures 1, 2, and 3.

Table 1: The student survey questions and weighted averages. n=6.

Question	Average
The Research Environment	
The mentor was available and responded well to my inquiries.	4.7
The work environment was safe and comfortable.	4.8
The mentor and the research team members helped to make me feel like a respected and accepted part of the research team.	4.5
My work in the research project helped me to gain insight into the research process.	4.5
The research project was interesting and kept me engaged throughout the internship.	4.2
The Living Environment	
Housing was clean, safe, and comfortable	4.5
Housing was convenient to work and other services	4.5
Housing was affordable	4.3
Transportation options to/from work and around town were easily available	4.8
Transportation options to/from work and around town were affordable	4.8
I felt like I had good opportunities to experience the local and regional culture	4.8
People affiliated with the university/work were friendly and helpful regarding my living situation	4.3
Program Administration	
Appalachian faculty established clear expectations regarding student performance in my STEM research abroad project.	4.3
Appalachian faculty and staff provided sufficient support for me for travel and other logistics (e.g housing, food, medical, ...)	4.5
The weekly "Google Hangout" sessions were a positive influence on my overall STEM research abroad experience.	4.7
The weekly blog entries were a positive influence on my overall STEM research abroad experience.	4.5
I would recommend this experience to other students in the future.	4.7

Figure 1: Student responses to questions aimed at understanding their perception of their living environment while at Angers. n=6.

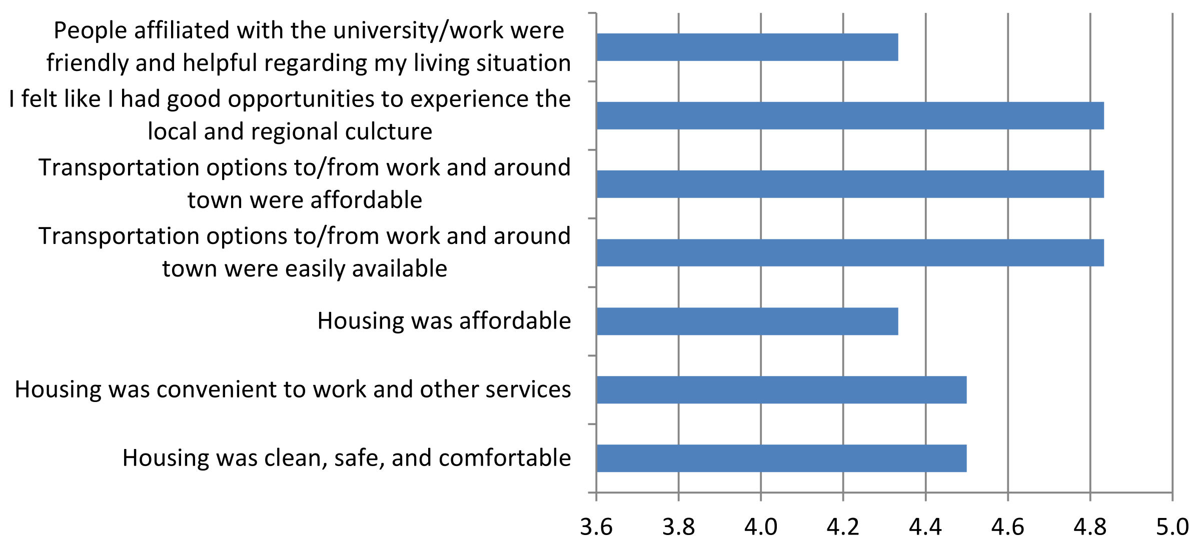

Figure 2: Student responses to questions aimed at understanding their perception of their living environment while at Angers. n=6.

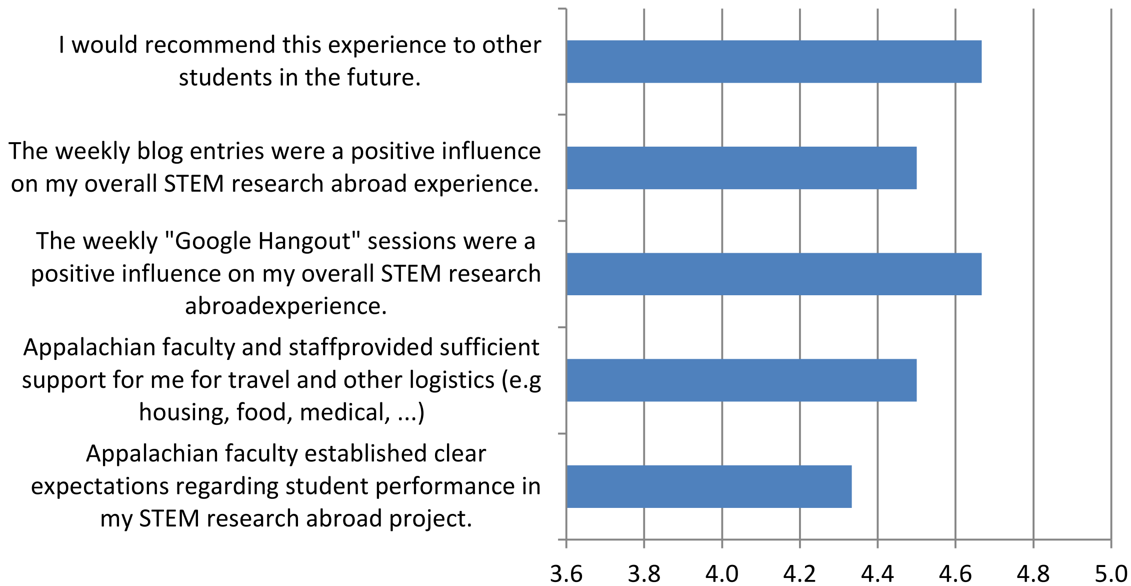

Figure 3: Student responses to questions aimed at understanding their perception of program administration. n=6.

In general, scores were high, with strengths in positive cultural experiences, safe and comfortable work environment, and overall impression toward recommendations for future participation. Lower student survey scores indicated a need to address sustained student engagement in research projects, housing affordability and helpfulness, and established, clear expectations by Appalachian program administrators at the beginning of the program.

Student Testimonials

"THE ADMINISTRATORS MADE THIS EXPERIENCE. I have so many positive things to say about every single person involved in this!!! AMAZING people, SO kind, SO helpful -- everyone went absolutely over the top to make sure we had the best experience possible. THANK YOU TO EVERYONE!!!"

"I really like the structure of this internship. I feel like two months is a great amount of time to be abroad and having it during the summer is very convenient. Also having two weeks at the end to travel was very nice."

"The internship is a good introduction to the expectations and type of work you will practice in research. Doing research abroad provides an interesting dynamic because there are language barriers which can lead to expectation barriers. This helped me become independent and required more interaction with my international peers and professor."

Mentor Evaluations

The mentor survey focused on two areas of interest: Experiences with student performance and program administration from Appalachian faculty and staff. The responses were limited to "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree", and "Strongly disagree". Each responses was weighted as a 5, 4, 3, 2, or 1, respectively and a weighted average was obtained and reported herein – see table 2 and figures 4 and 5.

Table 2: The mentor survey questions and weighted averages. n=4.

Questions	Average
Student performance	
The student(s) was(were) punctual and worked the hours required.	4.4
The student(s) was(were) respectful of me and responded well to instructions.	4.6
The student(s) worked well with the research team, and behaved professionally.	4.0
While at work, the student(s) used his or her time wisely.	4.6
The student(s) showed initiative, and brought energy to the research project.	3.8
Effectiveness of program administration by Appalachian faculty and staff	
Appalachian faculty and staff managed program logistics efficiently and effectively.	4.8
Appalachian faculty(PIs) provided clear expectations for your role as mentor to the student(s).	4.0
I would participate in future "STEM research abroad" projects again in the future.	4.8

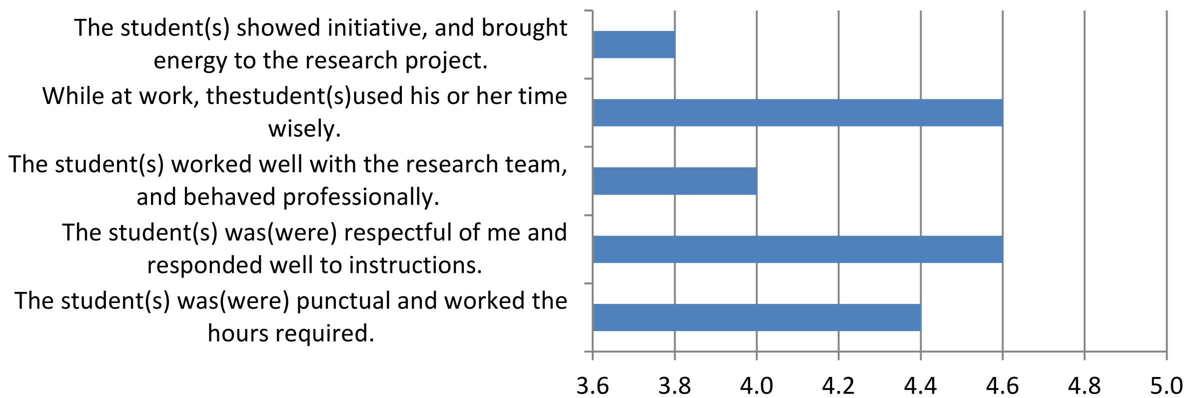

Figure 4: Mentor responses to questions aimed at understanding their perception of student performance. n=4.

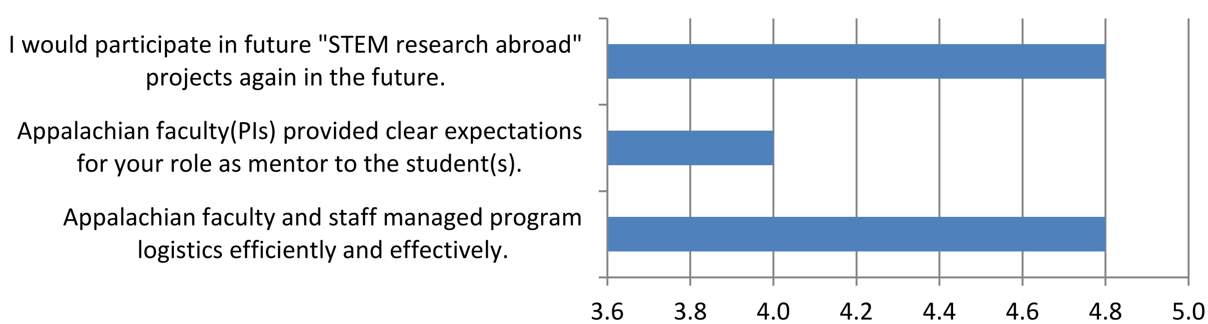

Figure 5: Mentor responses to questions aimed at understanding their perception of the effectiveness of program administration by Appalachian faculty and staff. n=4.

In general, scores were highest for student performance while at work, and for effective and efficient management of program logistics by Appalachian faculty and staff. All mentors agreed or strongly agreed that they would participate in future STEM research abroad projects again in the future. Lower mentor survey scores indicated a need to address student initiative and professionalism, as well as the need for Appalachian faculty and staff to clearly define expectations for the mentors at the outset.

Mentor Testimonials

"The students were very nice and were strongly appreciated by the group."

"The students Nicholas Stover and Jacob Harris have been working a lot and gained new skills in virtual reality. In addition, they have fairly contributed to our project concerning Building Information Modeling."

"It was a pleasure to work with my 2 students."

"For this 1st exchange, I should admit that I did not understand what I could ask to the student. Their academic level should be better explained."

"A longer period for the internship would be better."

"Information about the scientific skills of the students should be more precise. The duration (beginning-end) of the internship should be more precise."

Program Strengths and Weaknesses

Based on student and Angers faculty survey responses, input from student weekly "Hangout" session, blogs, and final reports, and informal input from Appalachian and Angers administrators and faculty, a list of strengths and weaknesses with suggested improvements was compiled to inform future projects.

Strengths to continue in support of students

- Provide as much institutional and grant funding support to the students as possible;
    - Explore new external funding opportunities and additional financial support from the university through the QEP or OIED in addition to the International Research Grant funded by OSR.
- Provide personal attention to student needs and questions on all aspects of preparation, travel, and the work experience;
    - Faculty should continue to accompany students to Angers to get them set-up;
- Emphasize to the students that they experience French culture by engaging in local activities, touring the area, and by traveling to other locations in France and Europe;
- Stress the safe and comfortable work environment provided by all Angers faculty;
- Stress the value of convenient and effective transportation options available to them in Angers.

Strengths to continue in support of Angers faculty

- Continue to include Angers faculty in the selection and placement processes;
- Appalachian faculty should continue to accompany students to Angers to help acclimate students and faculty;

Improvements to consider for the students

- Clearly define the start- and end-dates so that students can plan for additional travel before returning to the US;
- Suggest AirBNB or an alternative housing option (e.g. apartments) to students, which may be cheaper and more convenient;

- Provide clearer expectations and training where applicable for student behavior while at work, including:
    - students are expected to show curiosity and initiative in their work;
    - students are expected to behave professionally toward mentors and fellow researchers;
    - students are responsible for academic preparation necessary to maximize their effectiveness as researchers before and during the project.

Improvements to consider for the Angers faculty

- Clearly define the start- and end-dates to mentors prior to arrival so that they can better plan student activities and team integration;
- Clearly define expectations for mentors in their roles, and expectations of the students that they are mentoring;
- Better explain the academic level and preparation of each student prior to arrival.
    - Provide academic transcripts to mentors during the selection process (this was not done in this initial cycle).

In general, we will explore alternative models for administering the internship including:

- Not requiring the students to enroll in a summer session course, such that it is a pure internship. This reduces the financial burden on the students and allows more flexibility in the timeline for students and mentors (e.g. mentors wished to have longer internships). However, students may lose institutional services that come with course enrollments; or
- Expanding the course to a 10 week course, which would also allow more flexibility in the timeline for students and mentors, and would provide enough time for us to require the students to complete the survey and submit a report for their final grade. Note that grades had to be submitted before the students had enough time to complete their reports, so the grades were not based on the quality of the final reports. In addition, not all students took the survey – a 10-week course would provide time for students to take the survey as a course requirement. However, this option would require more financial support for the students since tuition and fees and living expenses in Angers would rise accordingly.

Attachment 1 – Estimate of student expenses

Office of International Education and Development
APPALACHIAN STATE UNIVERSITY

Personal Expense Planning Sheet for STEM in Angers Program

This worksheet is designed to get you started, but be aware that you may require more extensive planning if you have special circumstances. This worksheet is to aid you in the planning process so that you are aware of all costs that can be associated with your program.

Estimated Expenses- 56 days

Housing deposit (Approx. $297, including room insurance)	297.00
Summer tuition (Found here for 2015, will update in February, do not need to pay fees)	
Meals (approx. $11 a day, based on meals at Univ. of Angers restaurant, does not include any meals purchased on your own)	616.00
Housing (estimated by Angers)	559.00
Passport fees (if you do not have a passport)	
Immunizations, if applicable	
International airfare to Paris	
Train from Paris to Angers (round trip, maximum charge)	155.00
Lab items- Awaiting answer, will email you with estimate	
Health insurance ($1.42/day, add 4 days to cover travel)	85.20
Educational supplies	
Local transportation in Angers (Approx. $44 a month)	88.00
Personal travel expenses while in Europe	
Clothing/Laundry	
Miscellaneous	
TOTAL EXPENSES ANTICIPATED:	**$** 1,800.20

Estimated Resources

Family contribution	
Savings/Earnings	
Financial Aid	
Scholarship (To be disbursed with Summer I refund)	2,500.00
TOTAL RESOURCES EXPECTED:	**$** 2,500.00

Modified from NAFSA Sample Budget Worksheet

Attachment 2 – Student application form

Appalachian's STEM Research Abroad - Angers, France

Student Application - To be filled out by the student applicant

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Up to 10 students will be selected to participate in the Transatlantic Friendship and Mobility Initiative, STEM Research Abroad program for the Summer of 2016. This is a competitive process, so please insure that all requested information is provided.

Name ____ **Banner ID:**_____________

FIRST MIDDLE LAST

EMAIL Address: ___________________________ **Phone (   )** ________________

Home address: ____

Declared major(s): ___________________________**Overall GPA:** ________________

Please indicate your top two choices for general areas of research by placing a "1" and a "2" in the appropriate spaces below. Note that specific research assignments will be negotiated after the awards have been announced.

____ General Physics	____ Chemistry	____ GIS / Remote sensing
____ Electronics / Engineering	____ Biology	____ Computer Science
____ Optics	____ Geology	____ Environmental Science
____ Material Science	____ Geography	____ Mathematics

Checklist - Please enclose the following items with your application:

- ☐ Curriculum Vitae (2 pages maximum)
- ☐ Academic transcript (it can be an unofficial transcript)
- ☐ A personal statement – 2-pages maximum. This statement should clearly outline your future career goals and how participating in the program will advance those goals.
- ☐ Two letters of recommendation (these can be sent separately by those providing them).

Submit this form along with all items in the checklist to stemresearchabroad@appstate.edu
DEADLINE for applications is: **January 15, 2016.**

Awardees will be notified by January 30, 2016.

Student research will occur from May 14-July 8, 2016 in Angers, France.

Attachment 3 – Student pictures

Dan Govert – working in Frans Jorissen's lab

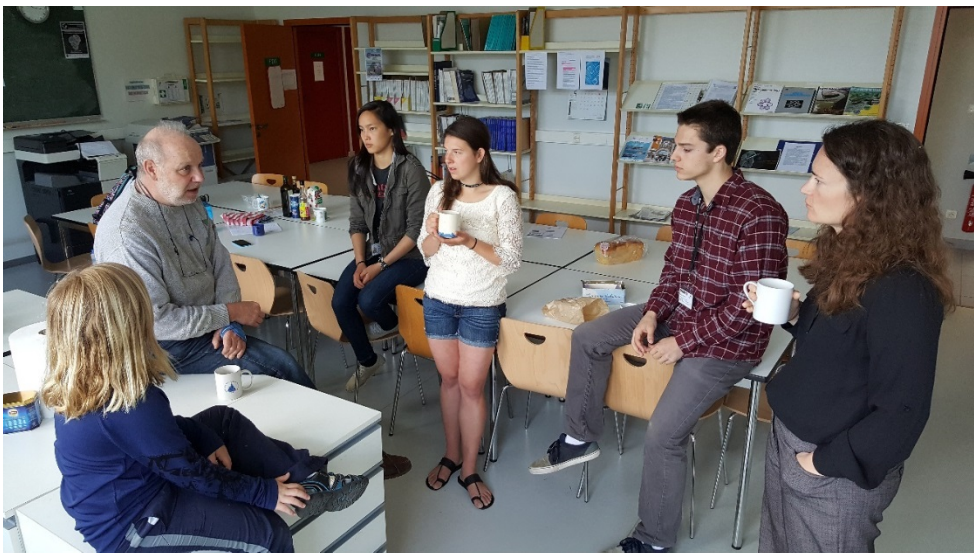
Bonnie Nguyen's workstation in Helen Howa's lab

Julia Hinds in Paris

Katie VanEtten with her new Angers friends

Screen capture of Nic Stover's project with Paul Richard

Eight members of the 10-member cohort (missing are Sam Migirditch and Andrew Murray).



Dr. Frans Jorissen introducing his lab to students Bonnie Nguyen, Katie VanEtten, and Dan Govert, with Zoe Thaxton (left) and Dr. Tonya Coffey (right). Photo by Dr. Chris Thaxton

Group photo the day after arrival (taken by John Webb of U. Angers): Left to right – Sergei Miles, Jacob Harris, Sierra Milosh, Nic Stover, Katie VanEtten, Dr. Chris Thaxton, Bonnie Nguyen, Nick Thaxton, Dr. Tonya Coffey, Andy Murray, Julia Hinds (not shown: Dan Govert and Sam Migirditch who arrived later that day).

Expanding Science Research Opportunities in France for Appalachian Students

Student Final Reports

10 October, 2016

Compiled by: Dr. Chris Thaxton

STEM Research Abroad: Project Summary

Bonnie Nguyen

Introduction

For the STEM Research abroad program, I selected the project: Relationship between planktonic foraminifera and ambient water biogeochemistry. Before coming into this project, I had no knowledge of foraminifera. The only knowledge I had about foraminifera was from my introductory geology class, Evolution of the Earth. The brief knowledge that I had was that foraminifera lived in the ocean and they were either benthic (bottom dwelling) or planktonic (floating). I acquired literature on foraminifera to read before coming, but it was a never ending whirlwind leading up to the moments before getting onto my plane, thus I wasn't able to properly prepare. This was a little nerve-wracking, but since working with foraminifera for the last month and attending the TMS Foraminifera and nannofossil groups joint meeting 2016 here in Angers, I have gained a greater knowledge of these organisms and their indications on the environment. This has been a very successful research opportunity, both academically and personally. I have traveled abroad more than the average twenty-something year old, but I have never lived in another country before and I've learned that it is a whole different experience from traveling as a tourist, in the challenges that you face and the lessons that you learn. Academically, this is the first time I've worked on a completely separate project from what I have been researching the past two or three years at Appalachian State University. Thus, it was quite the challenge to step into something I knew nothing about, something I was not comfortable with, and to make it even more uncomfortable—do this in another country with a completely different culture.

Working with Foraminifera

When I arrived to the foraminifera lab for my first day, I was immediately thrown into what would be my job for the next month. My job was to extract foraminifera from various samples that were taken from the Bay of Biscay. The samples I was working with came from the mission my professor named 'Pech 10' and this mission took place in 2010 and 2011. To collect the foraminifera, my professor Helena Howa hired a crew and ships that took her offshore in the Bay of Biscay. There they deployed sediment traps at various depths—300m, 800m, 1200m, 1700m, etc. above the sea floor to capture the planktonic foraminifera. The sampling took place in 5 to 12 day intervals for a year, meaning the trap would collect a sample for 5 to 12 days and then it would rotate to begin filling a new portion of the trap with the next sample for another 5 to 12 days. After the trap is retrieved, the samples go through a very precise and complicated process where the samples are filtered to have mainly foraminifera, sediment, and other organic matter remaining. The samples are then put into beakers filled with ethanol to preserve the foraminifera, and these are the samples I worked with.

The technique I learned to extract the foraminifera from the beakers was a bit surprising for me, as it was not at all computerized or complicated, and only required manual, human extraction. I had to place the beakers containing the samples under a microscope and use either a pipette or a 00 sized brush to extract the foraminifera from the ethanol/water mixture. I would transfer every last foraminifera in the sample to a petri dish. When there were no foraminifera left in the beaker, I could seal the beaker and put it aside and then put the petri dish into a heated fridge so that it would dry out the excess ethanol and water and leave only the foraminifera. The next day, I am able to take the dish out of the heated fridge and then begin the process of sorting the foraminifera by species.

Before I can begin to sort the foraminifera by species, I have to transfer the foraminifera in the dish to a gridded plate—it is gridded to help the person count the foraminifera easier. I place this gridded plate under the microscope and count the total number of foraminifera present, regardless of species. If there are more than 300 foraminifera present in the sample, I have to split the sample using some sort of splitting device that I don't know the name of, and is hard to describe. The device splits the sample size in half essentially, and I will split the sample until I have less than 300 foraminifera left on my gridded plate. Once I finish splitting, I then transfer the foraminifera to the final plate or slide. The slides are small, split into about 30 boxes that are numbered, and enclosed with a piece of glass. The foraminifera on the slide are sorted by species and then I am able to count the quantities of each species. I mark the quantities on a sheet of paper that mimics the slide and its numbered boxes. For example, in box 10 of the slide, I would place all the species Neogloboquadrina incompta from the sample. Next, I would count the quantity and note the quantity in box 10 on my sheet of paper. Essentially, this was my role for the project and what I have been doing for the past month.

Most of the time I worked independently, but I received a lot of help from the French grad students when I was unsure of what to do or if I had trouble identifying a species. I would've been completely clueless without them. The language barrier made things a little bit difficult, especially when I wanted to make sure I didn't mess anything up. The grad students were usually afraid to speak English to us, even though they knew English and they knew it was a good opportunity to practice. Although, I should've done the same and should've made a greater effort to speak to them in French and practice the little French that I knew. Most of my encounters in French were very slow, awkward, staggered and lead to nowhere. I observed that the French grad students had great work ethic and they took their research very seriously, which was inspiring to see and this helped me complete my work. At the conclusion of the project, I was able to complete 4 datasets out of 6 that I prepared for picking foraminifera. I was working on the Pech 10 mission alongside another student, a French grad student named Christian. He worked on the first half of the Pech 10 mission, while I worked on the other half. Together, our work will be assembled onto an excel sheet and my professor has asked me to look at the data and give my thoughts and analysis on the data, thus this was my last task for the project and I plan to complete this over the remainder of the summer.

During my last week here in Angers, the University of Angers hosted the TMS Foraminifera and nannofossil groups join meeting 2016, and I was allowed to attend. It was during this meeting that I was able to see and understand the importance of what I had been doing for the past month, because what I was doing was so monotonous and honestly very boring at times. At this meeting, I was able to read posters, listen to speakers, and finally— I was able to dive into the hardcore science behind foraminifera. It was at this point I realized that for the past month, I had been working behind the scenes, and this meeting is essentially the end result or the 'show' of all that hard work put together. I am not sure why I realized this now, as I have been doing research for the past two years, and have done posters and oral presentations before. I guess I only realize this now, because the path I had to take for this project was completely different from what I was used to before.

Personal Travels

Outside of work, I was able to travel and immerse myself into the city of Angers and the rest of France. I was able to meet a lot of French people and made a lot of friends from going out, but also from being a part of the CrossFit gym here. Normally, I am very introverted, but since being here in France and having this once in a lifetime opportunity, I forced myself leave my comfort zone and put myself out there. This was difficult, but one of the most rewarding things I have ever done. For once, I allowed myself to be vulnerable and because of this, I was able to develop many meaningful relationships with people. This has been important because I believe I have learned something about myself and have grown personally. I would like to take these lessons I've learned back home with me and continue to grow within my community at home. Before coming to France, I was pondering on the thought of taking each day as it came. I have always been a planner and I do worry about the future. Living in France has taught me to slow down and that I really should take each day as it comes, because we are not promised this day or the next. This thought leads into my spirituality and my spirituality has been tested since being here in France. At times—most times—I felt weak, but never doubtful or unsure of the purpose that has been given to me. If anything, I am leaving France with an even stronger desire to serve and love as Jesus does.
Conclusion

In conclusion of my trip here, I have learned more about what I would like to do in geology, which is not something with foraminifera—unfortunate, but this isn't a bad thing because now I know! I will be able to go back home and read the literature that I have on foraminifera with more confidence and understanding. I am hoping that my experience will help the STEM Research abroad program and potential students better prepare for future trips. My experience can serve as advice or as a template for anyone that will decide to participate. Angers is the perfect city to study abroad in, especially if someone is interested in traveling to France. The people in Angers are the nicest French people you'll ever meet. If someone wanted to learn French they will have an easier time because they do not speak with an accent here. The city isn't a huge city, so it is not crowded and overwhelming. The location of Angers can easily get you to Paris, Normandy, Nantes, Rennes, Bordeaux, Tours, and Amboise, so there is plenty of room to explore.

I am leaving with an amazing experience of France, countless stories of my adventures here, and most importantly some lifelong friends. I've learned to adapt, but I've also acquired new abilities and qualities about myself. France—I will miss your delicious pastries, your fresh baguettes, your cheese, and your chocolate. You have taught me so much, and I want to will come back to learn even more.

STEM internship and abroad experience in Angers, France

Dan Govert

I can't believe my first real scientific research experience is coming to an end! I never even imagined that I would be in France studying benthic foraminifera as an undergraduate student. This experience abroad will most definitely benefit me as a future geoscientist and beyond. The great amount of knowledge that I had gained as a scientist as well as an overall person cannot be summed up completely in just one essay. However, I will do my best to mention the most significant parts of this experience in France. Throughout this experience, I have learned how to become a more independent person as well as working on a scientific project with an international research team.

Research

Dr. Jorissen was very supportive at this struggling time for me in the beginning part of my research. Luckily for me, I didn't need my laptop during the first couple of weeks. I just needed to separate the raw samples from the bay of Santu and then pick the foraminifera from the three samples I analyzed under the microscope. I needed to do this in order to record and see which types of foraminifera exist in each specific marine environment such as a coarse sandy environment, or a muddy/silty environment. Preparing the sample for separation, organization, and collection of the foraminifera is a very long process that requires patience.

Once the sample was prepared and ready for picking, I was moved to another research lab with lots of French students picking foraminifera as well. Bonnie, Kati, and I felt very isolated at first due to us being the only Americans in the lab. However, the French students were very inclusive and were not shy like we were. We also discovered that the geology professors of Angers also came from different parts of the world as well. Once we knew that the students as well as the professors were also from around the world, a sense of comfort and welcome came over us. I wouldn't have been able to pick and identify my three samples of foraminifera effectively if I didn't establish a good connection with some of the French students to help me with the identification.

I finished picking and Identifying my three samples of foraminifera right before the week of The Micropaleontological Society conference. At this point, Frans gave me his excel data of all the twenty-six sample stations of the bay of Santu and I just began to fill in the data that I have found from station six, fifteen, and twenty. Afterwards, I was able to attend the conference and I really got to see the power of teamwork of scientists from around the world coming together to discuss a specific scientific topic. Undergrads, Masters, and Ph. D students as well as professors attended the conference and some even presented their findings of foraminifera. After watching how these scientists from around the world presented and discussed their findings, the motivation of being a part of a scientific research team came to me. The statistics on the three stations that I have worked on is just a small portion of a bigger project of twenty-six sample stations. I was part of a team of scientists that helped collect data on the twenty-six sample stations that were analyzed in the bay of Santu.

Travel

Traveling around France and Europe by yourself as a twenty-year-old college student is not the easiest thing to do. I have never traveled by myself to a foreign country before, so this was going to be new to me. When I had landed in France, I was extremely tired and began to experience jetlag for the first time in my life. Afterwards, I went to the train station to wait for my train trip to Angers and to eat some lunch beforehand. As I was eating lunch, my backpack which contained my laptop, glasses, research equipment, etc. suddenly disappeared. I haven't even seen Angers and my most important possessions to conduct research were gone. At that moment, I had never felt so lost, confused, disoriented, and alone. You can say that my happiness and excitement to travel and experience scientific research were thrown out the window.

After that miserable experience and my arrival in Angers, I had to contact a lot of people such as my parents, professors, insurance company, etc. to get that issue situated. Luckily, there were ten other American research students that were in Angers as well that I was able to socialize with to bring back my sanity. I couldn't believe how easy it was to connect with them as well as the other French students. By the first week, all of us were eating out together, visiting places in Angers such as the chateau, cathedral, ralliemant, La Maine, and other interesting places. I did make some friends at this point, however I still didn't have my laptop and other research equipment to use to study benthic foraminifera.

During the week, my research has been mainly composed of picking foraminifera from the sediment, but during the weekends I did travel some. The first place I traveled to in France was the Chateau de Breze which was a castle known for producing wine. This was the first trip outside of Angers that I had traveled to. All of the students from STEM research team were there as well when we toured the castle. Afterwards, we went wine tasting and toured a winery to see how wine is produce, aged, and bottled.

For the next couple of weekends, Bonnie, Kati, and I had planned a couple of individual trips as well. I am going to have to give a lot of credit to Bonnie here because she was the most experienced and prepared traveler out of all of us. We went to Paris to see the Eiffel tower, Arc de Triumph, and many other sites the weekend after the STEM field trip to chateau de breze. Paris was quite an experience for me because It trained me to become a more independent person and traveler by figuring things out myself and taking initiative instead of relying on others. Learning how to schedule a place to stay, transportation, and specific sites to see in Paris was quite overwhelming at times. Again, Bonnie did most of this herself, I was essentially her apprentice and learned from her how to do all of these things.

After Paris, Bonnie, Kati, and I went to the city of Tours and Ambiose to see another chateau as well as Leonardo da Vinci's house. We biked over 70 km and camped overnight next to the river of Loir and my goodness was that a horrible and cold night. However, all of those travel experiences were so worth it. Once those past experiences were over, I had planned a trip to Athens, Greece and Barcelona, Spain myself. I wanted to travel and I wanted to use my independent skills that I had learned from Bonnie and the past traveling experiences to increase my ability on being an independent person. This experience traveling abroad has taken me one step closer into becoming a young adult.

Research Abroad Experience

Jacob Harris

Studying abroad in France has been a great experience. Not only have I learned useful skills from my internship, I have also been exposed to a foreign culture with different education techniques. I previously lived in Germany for a year, and thus I was familiar with general European culture and how it differed from the United States. This was the first time I had done studying or research anywhere outside of the United States. Although my time in Angers was short, I was surprised at how different the Université d'Angers seemed compared to Appalachian State University.

The research was quite relaxed. I was expecting set times when I was supposed to be present each day during the week. Instead, we were told, effectively, to come in sometime in the morning and leave sometime in the afternoon. If we missed a day, our mentor would shrug it off. While this seems like a problematic way to advise research assistants, plenty of progress was still made. This just meant that if I was particularly productive one day, I would leave earlier than normal. It almost meant I had more freedom to set my own hours.

I was also expecting significant oversight on the project. This was not the case. Our mentor would assign us tasks and then set us loose. He would not check-in often to see our progress, expecting us to let him know when we were ready for another assignment. I later learned more about the French university system. Unlike in the United States, higher education is not notably independent. The students spend more time with the professors and are expected to communicate often with their professors. The French students have less homework but more class time, as opposed to the American students who are told to put in three hours outside of class for every hour in class, as a general rule. Each time I asked for the next step of the project, our mentor would be ready to explain it to me. He would not let me know without my prompting, though, as he expected me to be more dependent.

Something interesting about the French students in our group was how often they would take breaks. There was often at least one coffee break in the morning and another in the afternoon, each about half an hour long and lunch was usually an hour. The entire lab setting was relaxed. There was not intense focus throughout the day in an attempt to produce project results. Numerous times, the French students would comment on how hard-working, and sometimes serious, I was since I would work on the project from the time I got to the lab in the morning to the time I left.

While I entered the project knowing next to nothing about computers, I have learned a lot. The goal of the project I was working on was to use virtual reality as a means of assessing building integrity. Before starting, I felt that I would be a poor fit for the project. On the contrary, I ended up making significant progress, especially in the last couple weeks.

The first week was devoted to some tutorials. I learned how to use the game engine Unity to model an environment as well as create animation and interaction with a moving character. This brought me some knowledge on programming in C#. Next, I started working on the actual project: modeling a virtual office space to be placed in a premade factory setting. I used the program Blender to create a mesh for my virtual office space and add textures.

The next struggle was importing my Blender model into a Unity project. While the basic functionality of Blender to Unity already existed, there were many small errors, stemming especially from my lack of previous computer experience. Google became my best friend as I searched the Internet looking for solutions to various issues. I would often fix one issue only to have that fix break something else. I learned how to successfully research solutions, and felt very successful upon finally importing my model to Unity.

From here, I had to give my model collision. My initial approach was creating basic shape colliders for each wall and desk. I soon discovered a mesh collider, a collider in the shape of each object's mesh, making collision trivial.

Finally, I had to start programming. I expected the programming to be hard, and it was; however, the more I worked with the coding, the more I started to see what I needed to manipulate and the easier it became to figure out the steps I needed to take to completion. I had to create a script that would allow me to interact with the computers in the virtual office space. Since there was already a similar script, I knew I could work top down. I took the pre-existing script and removed what I did not need. It did not take long for me to understand what each part of the code did and how I wanted to change it to suit my goals.

By the end of the project, I could interact with the computers by clicking on them. This brought up a GUI with a text paragraph and an image, both of which could be easily edited. There were also preliminary Start and Pause menus, though I did not have time to make much progress on refining these.

Overall, I learned a lot from this project, and made good connections with French students. I feel that I learned even more from simply being in a foreign education environment, however. Like learning a new language, studying abroad gives a whole new perspective to what I am used to and take for granted.

Adventure in Angers

Julia Hinds

Bonjour, je m'appelle Julia Hinds. I am rising junior at Appalachian State University and double majoring in chemistry and physics with a minor in mathematics. This summer I had the amazing opportunity to participate in the STEM Research Abroad Experience at the University of Angers in Angers, France. Researching here has been such a wonderful experience. From learning about cooperative motion in a fragile non-monotonic supercooled liquid to running my first international marathon, it has been an adventure.

At the University of Angers, I worked under the guidance of Dr. Teboul, and using molecular dynamics simulations, we studied the finite size dependence of the dynamical propertied of a liquid and investigated the presence of a cooperative length scale in a supercooled simple diatomic fragile liquid (a very simple glass-former made of linear, dumbbell Lennard-Jones molecules). Our aim was to investigate the relation between the cooperativity length scale the system size modifies, and the dynamics of the liquid. When the temperature decreases, we found that functions measuring cooperative motions, such as the dynamic susceptibility, the strength of the aggregation of the most or least mobile molecules, and the strength of string motions, all display an increase of their maximum values. These functions also display a decrease of their maxima when the system size decreases, concluding that when the system size decreases, cooperative motions cannot extend to distances larger than the box size, which leads to the observed decrease in cooperativity. These results agree with previous works on using finite sizes to investigate the presence of cooperative length scales in various glass formers. We found that the relaxation time of the cooperativity decreases as the system size decreases when comparing the decrease of the cooperativity with the evolution of the relaxation time of the material, which is expected if there is a relation between cooperative motions and liquid dynamics. When the temperature decreases, the cooperativity increases with the ☐ relaxation time, cooperativity will also decrease the ☐ relaxation time in different glass-formers, such as in silica and in Kob Andersen mixtures of Lennard-Jones atoms. Overall, we found the finite size dependence of the transport properties is non-monotonic, suggesting the presence of two different competing physical mechanisms with different scale lengths, which may explain why opposite trends were found in other works when studying the relaxation time evolution of the system size.

Filling the role as a computational physicist has been interesting. Since I am only an undergraduate, understanding the physics of the project was quite an obstacle. That, along with computer programming, presented a challenge for me, especially since I have never programmed before in my life. From coming into lab on the very first day not understanding anything from the science of cooperative motion to what a computer terminal is, I would say I have come a long way. I am still a novice at both of those things, but reflecting back, I have gained a lot from this experience. I learned how to approach a subject I knew nothing about and learn enough to be productive. I also learned how to use and operate in Linux. It was a steep learning cliff, but a great challenge. Thankfully, I had a fantastic lab group to help me with understanding the physics and computer aspects of my project. They were beyond helpful with everything I needed and they took the time to explain things in detail so I could actually understand what I was doing. They also opened up and took me under their wing so I would not feel alone. During lunch, we would go to the cafeteria and talk about our different cultures. They were all from different backgrounds (French, Romanian, Turkish, etc.) so it was interesting to talk to them about their cultures and opinions. From learning about their cultures at the lunch table to working with them in the lab, they made my time here so wonderful. I will forever be grateful for them and the kindness they shared to me. Working with a multicultural lab group has broadened my horizons, and I hope I will have more opportunities in the future to work with such a variety of people.

The county France has always had a special place in my heart. Ever since the first time I travelled to Paris it has been one of my favorite places. I visited le Mont Saint Michel during my last trip to France, so it was nice to be able to travel there again. However, this trip I decided to run my first international marathon! Before getting there, I just assumed it would be like any of the other marathons I have run, but I was very wrong. There were at least 5 things that were different from the typical American marathon.1: The race expo was not at the start or finish of the marathon. The race expo was in Saint Malo, which is approximately one hour away from le Mont Saint Michel by car (about 9 hours walking). I did not realize this until Friday night (two nights before the race) so I was having a bit of a panic attack trying to figure out how I would get there. My first thought would be taking the train/bus. But there was a little dilemma with my credit card and the bank so thankfully Jacob, a guy from the group who was traveling with me, found a guy on BlaBla car who was a racer heading that way (blabla car is basically uber for going long distances). So for about 10 euros I was about to go and come back from Saint Malo with a guy named David. 2: You don't get a t-shirt until you finish. This was surprising because in every single race I have run, you always go to the expo, pick up your race bib, and then get your t-shirt. But when I went to the race expo in Saint Malo, there was not place to pick up a t-shirt. I asked my new friend David about it and he said that "it so you don't just get the shirt and go 'ahh yeah I ran that!' it is so you know if someone actually finished the race. A little extra motivation." Which I thought was interesting. 3: Most runners do not run with their phones or music. I was probably about 1 in 10 people listening to music. But throughout the course they had live music such as local bands, or school bands just on the side of the course jamming out. I can understand why people did not listen to their own music. It was very cool to hear the local music! 4: There are no bathrooms on the course. Normally there is one every three or four miles, but none for this marathon. Which was bad for me because I really had to go at mile 11. I unfortunately had to make alternative plans. 5: They do not hand out beer at the end. This was interesting because most racers consider beer as just "empty calories" which is good at the end of an endurance race such as a marathon. As for the rest of the trip, it was amazing. Overall, it was an amazing experience and I loved every moment of it (even in pain), and actually touring le Mont Saint Michel was just as amazing as ever. It was just as breathtaking as the first time I visited, and I know it will not be my last visit.

My experience here in France has been one that I will never forget. It has broadened my perspective on the scientific community and allowed me to have amazing adventures. My only regret is not learning enough French to communicate efficiently. While I can read and write, I wish I had more time to practice my pronunciation skills. However, language barrier and all, I can honestly say this program has been one of the most influential experiences in my life, and I look forward to what the next adventure may bring!

Seven Months Abroad

Sam Migirditch

This last week is a good time to look back and reflect on seven months which have been defined by having to re-evaluate myself and habits. When you go to a foreign country for an extended period of time, all of your habits and old assumptions about daily life break, you're in a foreign environment where both large and small details seem randomly re-ordered. I think it's common knowledge that the small details are what cause the most trouble for people living abroad. Big cultural differences can be focused on and directly resolved, but when small things don't work, for example when you can't figure out how to get credit for you cellphone, or which dairy bottle is milk and not butter milk or creamer, it can feel like fighting a swarm of bees, very often attempting to fix one problem creates more. Hostly one of the biggest aids in surviving this overwhelming feeling was being a researcher, which already had taught me how to fix things when all the pieces are broken. However this semester offered much more than stress management lessons, I firmly believe in approaching every challenge as an opportunity to learn something and some very unique opportunities were available here. There is a true blessing to having all of your old customs and habits suddenly break, you become painfully aware of how much of your life had become mechanical responses. While habits are not inherently bad, such a sea change wipes the slate clean and gives you a very harsh light to examine the validity of you habits with. I've made lifestyle changes which I probably never would have made with out this experience, these have ranged from my approach to academics and research to my views on art and lifestyle. College is a time of incredible personal change, which requires lots of emotional processing in order to be a healthy change. It's common knowledge that many STEM majors (but primarily physics and chemistry) have no where near enough time to do this, causing an unacceptable number of people to develop serious mental health issues which may or may not be diagnosed later on. A semester abroad, at least for me, did more good on this front than any college preparedness program or study hall. Unfortunately, STEM majors are among the least likely to spend a semester abroad, despite being one of the demographics who I hope to show, benefit the most from it.

The academic side of this experience was eye opening to say the least. Certainly one of the hardest aspects of the trip, I was never informed by anyone that French courses are made of 3 hour long bi-weekly lectures, homework is never given, and your entire grade is based on a mid term and a final. I was also not told until very close to my time of departure that all of my courses would be in French. I am proud of my performance given the circumstances. I picked up enough a lot of French related to physics terminology and rebuilt my entire studying plan due to the radical differences in course structure. E&M was a much lower level course than I anticipated but the sort of questions being asked framed the material in a new and enlightening way. Continuum mechanics on the other hand was a savage experience, easily the most difficult course I've ever taken, language barrier withstanding. I have no doubt that I did horribly in CM if I even passed, but it was a fascinating subject and I am proud that I was able to grasp the material to a reasonable extent. Interestingly one of the best lessons I've learned in France came from that class. Typically I take academic imperfection very hard which has often had a sort of domino effect on my academic performance in Boone, but here having to face real failure, not just a 78 on a test, but actually flat out failing it, lent a perspective that I really needed. It's easy to mope through a defeat if the only thing in danger is your ego, but with CM I had to face repeated crushing defeats, real defeats which forced me to pick myself back up and fight even harder than before or give up entirely. I am interested to see how my next semester at App goes now that I have seen things this way.

Research was another beneficial culture shock. Research here is fundamentally different all the way down to the typed of questions that are asked. Most important are the international science skills I developed; the differences in approach as well as language barriers can sap productivity, requiring practice to identify and overcome. Living in such a globalized and collaborative world, I would say that an undergraduate who does not have at least a small amount of international research experience is not graduate school ready. On a more specific scale, the particular research I did, a study of molecular dynamics in glass-like media under the affects of embedded nano-motors as well as a separate study of the effects of finite sample size with periodic boundary conditions on molecular dynamics simulations, opened my eyes to a beautiful area of research which I expected to be boring. I also learned valuable research skills such as writing quick scripts to handle file management when you have to take data sets over tens of independently varying parameters, as well as how to debug and write in a programming language that I like to call “physicist's C”. Physicist's C is a lot like C but with all of the good things removed. I would describe it with the following analogy:

"Imagine you are trying to fix a very large machine full of delicate parts while it is running, but all you have is duct tape. Also the entire machine is made out of wads of duct tape, and you are also made of duct tape; everything is broken and sticking together and everyone trying to fix the machine at the same time, soon enough no one can remember which duct tape wads are vital parts or desperate patches, but that doesn't matter anyway because if you try to pull one part out you'll just damage everything else around it. "

As fun as it is to laugh (and sometimes cry , scream in frustration, or want to throw computers out of 3rd story windows) about the frustrating side of research, my mentor Dr. Teboul taught me more about being a good scientist than 3 years at a university has. He taught me how to think about problems when things don't make sense intuitively and the chaotic and many body nature of the problem dilutes the value of any direct mathematical insight into it. The result was discovering a passion for soft matter physics that I very well may carry through graduate school.

There is little doubt in my mind that the longest lasting influence from this trip will be what it showed me about living simply. Europeans live to live, they want to enjoy good food and drink in good company, pursue various artistic or scientific passions of curiosity, and be happy. Careers are a means to this end and not a meaning of life in themselves. It's cliché to say that Americans are materialistic, but I didn't see how deep the root of materialism runs into American culture until I left it. There is a widely unnoticed or maybe just unspoken insanity is working late every night, never seeing family or friends, in order to afford pieces of plastic and metal which we only superficially want and which don't make us happy in any long term way. Further, America's “throw it away” culture is ecologically disturbing, to the point that I am unsure how I will face it when I return. But I don't just want to trash the reputation of the States, in fact, I would say this trip has shown me the enormous potential the US has if it can improve. I think the US is riddled with social, racial and economic problems, and a large part of me wants to fix them because of what Europe has shown me we could be if we persevered.

Bottles of wine and letters of gratitude can never express (although bottles of wine certainly help spread the sentiment!) how thankful I am that this experience was made possible. For what it is worth, I would like to explicitly thank Dr. Hester, Dr. Coffey and Dr. Thaxton for having the drive to create the opportunity, I also owe most of my skill as a computational researcher to Dr. Teboul's patience and brave attempts to explain abstract concepts in a non-native language. Programs like this one change lives, permanently. They are a true source of real and permanent change in the world. As the world continues to become a smaller place, this type of experience becomes a vital part of the education of a functioning member of humanity's international society. Nothing else reduces the feeling of “otherness”, the idea that the people of different nations are some how different than us, a sentiment that we need to irradiate if my generation wants a peaceful future. These programs prompt personal growth which improves quality of life more than any degree or piece of paper can, while also serving as the best sort of advertisement for a school; to see that a university uniformly produces broad sighted and worldly individuals says something that brochures never can.

Finding Success as an Adult in the big wide World

Sergei Miles

Prior to this trip, and for the majority of my life, I have often wondered what constitutes an individual becoming an adult. At what point does a human being cease to be a teenager/kid and enter the world of adulthood? I figured only with time could I find an answer to be satisfied with, and I believe I may have found that answer for myself during this research abroad experience in Angers, France. On June 12th I turned 20 years old and could no longer be called a "teenager". However, it is more than age that defines an individual as an adult. The mind must recognize growth should always be sought for, the individual must accept that he/she is solely responsible for his/her own well-being, and when plans meet with failure that same person must be willing to accept whatever consequences may follow with that failure.

This trip began not when we first arrived in France but when we were dropped off at the dormitory and left to our own devices. It was the first time in my life that I had a set budget in my bank account to live off of, and all of my basic needs had to be tended to only as I saw fit through that budget. Living here has been entirely different from living on campus at Appalachian State University. At ASU I could wake up in the morning, walk across the street to the cafeteria, and then walk down the street to whatever class I had. No serious thought had to go into planning my daily routine. Here in France, for the first time in life, I actually bought cooking supplies so that I could eat cheaply to spread out my budget. I was entirely responsible for sustaining myself in an affordable manner. I believe that such a step is one of the first marks of adulthood. It's one thing to cook at home with my parent; however, to cook and eat with pans, plates, and forks I bought myself is an entirely separate experience.

The next objective that naturally occurs with the onset of adulthood is the desire to grow and become something more than I once was. Growth can even be accelerated by taking on company with like-minded individuals such as the environment provided by this research abroad experience. In such an atmosphere the individuals of the group become a support network for one another. Travel plans are discussed and decided upon together, and when mistakes are made we each equally accept the responsibility of whatever may follow. Whenever a member of the group might be unsure of how to do something then the individual can easily reach out to the rest of the group and glean solutions from brainstorming.

No other trip reminds me better of this than when Jacob, Julia, and I set out for Le Mont Saint Michel. It was the first trip we attempted on our own without any outside guidance as to how to best accomplish travel and find a place to stay. Luckily, Julia had previously booked a room for three that we could use for the days we were there; that was one less concern for Jacob and me. Next, travel arrangements had to be made. Julia again had already purchased her tickets for travel so Jacob simply bought the same ones. I looked at her tickets but was concerned about whether or not my Eurorail pass would be accepted because some of the tickets listed "autocar". We weren't sure what an autocar was and decided it must have been some kind of train. I researched for myself trains that would accept my pass so I wouldn't have to spend extra money. However, during this entire process a dangerous assumption had been made. Julia's tickets listed a Ponterson as part of the destination, and my Europe rail map listed Ponterson and Mont Saint Michel as the same stop. So we assumed we would end up at the same spot. Comically, the hiccups of travel began long before any of us reached Ponterson.

The first train was from Angers to Nantes early one morning, and we all had the same ticket. Jacob was running late while Julia and I waited for him on the platform. We texted Jacob ahead of time which "voie" we were at so he could find us easier. As it happened there was already a train at the stop, but the train we were planning to take was arriving behind the current one. Jacob, in a hurry to catch up, was bewildered and went ahead and jumped on the train at our voie without Julia and I seeing him. The train departed, and the three of us were separated while Jacob was on the wrong train. Thankfully, both trains went to Nantes so we were all able to meet up again before boarding our next train for Rennes. From there my troubles began as we discovered an autocar is a bus, and that Julia and Jacob's bus stop was different from my Ponterson train stop. I arrived in Ponterson ahead of them and waited an hour for them to show up. Turned out their bus went directly to Mont Saint Michel which was about a 20 minute drive north of Ponterson. I was alone on my own with no one to reach out to for help, separated from the group, and I had to find a way to get to where they were. After wandering through the small town I eventually found a bus stop and decided to wait there. A local suddenly stopped in front of me in their car and asked if I was going to Le Mont

Saint Michel. I said I was, and he offered me a free ride to where my friends were. Things worked out, but it was certainly an interesting adventure.

The final event at Le Mont Saint Michel marking adulthood occurred on the first night in our hotel room. Julia was starting to panic because she realized that the race number sheet she needed for the marathon she was participating in had to be picked up in a town an hour away by car. On top of that her bank card wasn't working for whatever reason. Jacob and I were present to offer assistance, support, and brainstorming. While Julia was on the phone with her bank, Jacob and I searched for a way to get her to the town and back. Eventually, we found a "blahblah" car she could use. The crisis was averted and a solution had been found. Julia later told us that she wasn't sure what she would have done with all of the issues piling up at once. As a group of adults we were able to offer support to one another.

The final notable trip for my journey into being an adult was my solo exploration of Bordeaux. By this point in time I had a solid grasp for the transportation system so no complications followed with arriving in the city. The only issue I encountered occurred solely because of my own naivety and optimism. I had planned on spending one of the nights in the local youth hostel; however, for the first night I had made no arrangements for a place to stay and figured a park bench wouldn't be too bad for one night if I could save some money. By far, it was the worst decision I've made in my life. Getting comfortable for the night wasn't too hard to begin with; rather, the difficulty of the night arose with the onset of rain. Even then the rain wasn't too bad until the water had soaked through my clothes, and I could no longer keep warm. I gave up on trying to sleep and instead walked around and tried to keep moving to save whatever warmth I could. That night was the most miserable I have ever lived through, and the situation was entirely my own fault. No one else was around and no one else could be blamed for the failure of my own actions. I had no other choice but to accept the consequences that such a decision entailed. In the morning I warmed up and changed into dry clothes. The night was over and I could strive to do better in the future. Despite the night, I had a wonderful time in Bordeaux and even got some nice night time pictures.

My point from all of this is that not only have I grown as a student through the research here, but I have also grown as an individual by dealing with varying experiences that arose during my stay here in France. I have learned to continually search for knowledge, to take care of my own needs, and to accept any consequences that may follow with the decisions I make. Not only have I had an amazing time exploring France, but I believe I have also become an adult.

On Being Alone

Sierra Milosh

Secretly, I have always been a bit of a loner. Certainly I explode into color and celebration and laughter when I am around certain people, but I often slip away from the noise unseen and retreat to a quiet corner. I need my alone time. I need to process everything that has happened to me that day, or I will wake up the next morning in a panic. If anything, my alone time needs have intensified in Europe. There is so much to process that I need to constantly keep up with my thoughts. But Europe has so much to process in an entirely different way than the U.S. The United States seems to be in a constant state of turmoil. Boone is a particularly calm area, but wandering too close to a city produces chaos. Everyone is in a hurry, pushing past each other, honking, and doing five things at the same time, all on the way to some other errand or meeting. France likes to take things slowly. When you sit down at a restaurant table, you are expected to stay there for hours, and eating on the go is unheard of. People here take the time to relax and to catch up with friends. It is lovely to see such importance placed on human interaction, but I can only watch from afar.

Not speaking French has forced me to be an observer rather than a partaker. The social part of me wants so badly to crack a joke or to brighten up a stranger's day. I want to hear what the people around me are talking about, but je ne comprends pas. No matter how much effort I put into blending in, I will never be able to fit in. This is not my country, and I am aware of that at every moment of the day. One thing I refuse to do though, is to retreat to my comfort zone. It would be too easy to avoid speaking French at all costs by surrounding myself with a huge group of English speakers. We are a force to be reckoned with when we travel together, which is hilariously entertaining as well as slightly embarrassing. We draw too much attention to ourselves; we take up the whole sidewalk, raise our voices to shout over one another until the cobblestones echo with English, and are just generally oblivious to the stares we get from people around us. I love my group, but I would rather travel alone and be an outsider than with a group and be a nuisance.

These are the thoughts that I had to gather within myself for the first few weeks here. I could not pinpoint my source of stress, and I was unable to answer when people kept asking why I so often wandered away from the group by myself. Finally I had to sit down at a café, order a large beer, and hammer out my thoughts. Once I realized why it was that I felt the drive to be alone, acceptance followed. I planned a trip first to Poland, and then to Amsterdam, completely solo. I began writing in my journal more, taking the time to write down seemingly significant observations from the cultures that are not my own. Traveling alone in Europe is something else entirely. It is complete freedom, it is loneliness, it is the deepest sense of joy and contentment, and it is brimming with learning experiences if you keep your eyes open.

My eyes are almost always open when I am alone, soaking in everything around me. I have seen how people express happiness in cultures unfamiliar to me. Like many things about France, the French like to express happiness subtly. Happiness is a twinkling in the eyes, a small smile, or a happy glance down at their feet. Outbursts of laughter are rare, but the eyes have enough mirth to cover it. I have seen the deep care people have for one another. Strangers do not get a show of affection more than a quick la bise or a soft "bonjour," if even that, whereas two friends running across each other on the street is truly magical. They exclaim happily, acting like they haven't seen each other in years. They tenderly hold each other's shoulders while they go in for a more extended la bise, sometimes even throwing in a third or fourth kiss. They stand close to each other and talk quietly, smiling contentedly the entire time. The part I love the most about French relationships is that gender preconceptions are not nearly as distinct. A man kisses a man he finds dear, just like he would a woman. I have seen grown men hug each other rocking back and forth with their eyes closed. Here, you love someone if you love someone, and you show the affection you feel regardless of gender.

In Poland, I noticed what I thought of as a watered-down culture, particularly in the city center. Krakow is a big tourist attraction. Everyone you come across in the center immediately speaks to you in English, handing you coupons or offering you a bicycle tour around the city. Not many people genuinely talk to you until you push the issue. They seemed confused at first why I was asking them questions, and some of them never really understood that I wanted them to open up. I often abandoned my attempts, realizing that they would only ever see me as an American tourist. Sitting at a café in Krakow was worlds away from sitting at a café in Angers. I watched drunken tourist after drunken tourist stumble by at 2 in the afternoon, yelling incoherently to their friends. I watched horse carriages pass with their passengers taking pictures the entire time. I watched street performers, both talented musicians and plate-spinning clowns, get videoed by tourists who quietly slid away when it came time to ask for money.

But the magic in Poland was held outside of the city center. Once I found the green pathways in the park, everything fell silent. Couples were reading together on benches, older men were grinning as they fed the pigeons, and the cameras ceased. The little side streets held hidden gems of coffee shops and local stores, with shopkeepers who were more likely to take the time to engage with a stranger. The smaller streets in Poland were where I felt there was the deepest cultural expression. Nobody was pining for the tourist's money anymore, and the English faded away. Now I was surrounded with the more drawn-out, melodic sounds of Polish and the calmer pace of things.

Somehow, I felt like even more of a tourist in Amsterdam. I constantly had to pull out my map the first day, even breaking down once or twice to (gasp) ask someone where I could find something! Again, things in the city center were more catered to tourists, but sneaking off to the side and wandering the edges of the city provided at least a bit of insight into the local culture. I also found some perks to being a solo traveler. I went into bars on the little streets, making friends with bartenders and regulars, asking them about their perceptions and their ways of living. I heard recommendations for shops, parks, and restaurants, which I later found on my map and tracked down. I got a free slice of apple pie from the shopkeeper who might have had the "sweets" for me, and I got to talk to a bartender named Clare for hours during the slow shift. I shared a table with two young Germans in a coffeeshop, where we compared cultures and laughed at each other's pronunciation of certain words. Once again, I was able to reach out to others! It was glorious, being in a city where everyone spoke my language, and yet, I still felt a bit of that American guilt. Somehow it felt a little wrong that people were catering to my lingual inadequacies, even though Poland already requires their children to take English each year of schooling. When I inquired about Dutch, I often got the response that it was "useless to try to learn," or "too hard." This baffled me a bit, but I still tried to use the words for "please" and "thank you," earning me a few subtle smiles along the way.

Traveling alone in Europe has taught me many things. I have learned how to connect flights and trains, how to budget my money and time, and how to book the best place to stay ahead of time. I have learned to depend on myself to get around, and I have learned that it is OK to ask for directions. But mostly, I have learned how to be a traveler, an explorer, rather than a tourist. Wandering around a city by myself has provided me with more sights, smells, experiences, and conversations than I had ever imagined possible. I believe this trip has made me a stronger woman, and I have come to trust myself a great bit more. "Wanderlust" is beginning to make sense to me for the first time in my life, and I am excited to use my experiences of being alone in Europe toward future adventures!

STEM Research Abroad: Creation of Recombinant Plasmids

Andrew Murray

My main goal in participating in the STEM Research Abroad program was to obtain a unique scientific research experience. Experiencing the culture and practicing my french speaking skills factored into my decision to participate, but the scientific experience was the main motivating factor. I did not know exactly what I hoped to obtain from the experience, but the possibility of experiencing something unique was enough of a driving motivator.

My project revolved around the creation of plasmids containing a mutant gene, which was one small piece of a larger project. The main research involved the study of the Scedosporium species of fungi, particularly S. boydii, S. apiospermum, and S. auratiacum. These fungi are typical opportunist, and are the most prevalent agents of mycetoma in temperate, moist climates (Castro et al, 1993). Of particular interest to my lab was the relationship between Scedosporium and Cystic Fibrosis patients. Cystic fibrosis (CF) is an autosomal recessive disease, and is caused by a mutation in the Cystic Fibrosis Transmembrane conductance Regulator (CFTR) gene (Boyle, De Boeck, 2013). CFTR codes of a cAMP/PKE-dependent, ATP-requiring, membrane chloride ion channel, whose major role is to maintain the homeostasis of the airway surface liquid layer. If this homeostasis does not function a thick layer of dehydrated mucus forms in the airway which entraps microorganisms like bacteria and fungi. While advances in the treatment of bacterial infections has led to an increased life expectancy in CF patients, fungal infections remain problematic. Scedosporium apiospermum species are the second most frequently isolated fungi from the respiratory tract of CF patients (Rougeron et al, 2014). Scedosporium have a particular affinity for the central nervous system (CNS), but the vast majority of CNS infections occur in patients with immunodeficiencies or patients of near drowning events (Kantarcioglu et al, 2008).

During infection and tissue invasion the fungus is exposed to reactive oxygen species generated by the immune system. This is called oxidative stress and can alter macromolecules, particularly membrane bound macromolecules, which leads to cell death (Ghamrawi et al, 2015). The phagocytosis of Scedosporium conidia by polymorphonuclear leukocytes (PMNs), mononuclear leukocytes (MNCs) and monocyte derived macrophages (MDMs) was studied in two fungal isolates. One isolate was derived from a fatal infection that had been resistant to an antifungal medication called amphotericin B and the other from a successfully treated subcutaneous infection which had been successfully treated with amphotericin B. Exposure of the amphotericin B resistant strain to a simulated immune response resulted in higher levels of superoxide ion release from PMNs but lower actual damage to the fungal hyphae from the PMNs and MNCs. This strongly suggested that the survival of the amphotericin B resistant strain was maintained by the fungi controlling redox homeostasis after being subjected to phagocytosis (Gil-Lamaignere et al, 2003).

Due to the evidence of the importance of Scedosporium controlling the oxidative stress generated by the immune system, my team at the University of Angers decided to investigate genes involved in this oxidative stress response (OSR). To do this they exposed Scedosporium to oxidative stress, and used qPCR to measure which genes were upregulated in response. Six genes were identified and chosen as experimental targets, as well as a promoter gene hypothesized to control the expression of all six genes. Additionally a gene controlling the creation of a GPI linked protein was chosen due to recent research showing its synthesis to be an effective therapeutic target (McLellan et al, 2012). If the removal of any one gene removed the fungus' ability to respond to the oxidative stress it could be considered as a therapeutic target. Then initial plan was to test immunotherapeutic methods, but the data would be valuable even if this method did not prove viable.

While there are several viable methods involved in the creation of a knock-out mutant species, the first method chosen was the creation of bacterial plasmids with mutated versions of the gene of interest. The plasmids sequences could then be introduced into Scedosporium in order to test their role in the OSR. My job was to create the plasmids in bacteria, and test the plasmids to make sure that the gene had been incorporated correctly.

The first step involved in this process was the amplification of the 5' and 3' UTR of the gene of interest. Primers designed to amplify the desired sequences were created before my arrival, which I used to amplify a sequence as instructed. I then digested the result of the PCR with two restriction enzymes, which created the strand of DNA to be incorporated into the bacterial plasmid later. In order to actually get that strand of DNA I first needed to precipitate the DNA from the digestion. This involved added 1/10 the volume of the solution of Sodium Acetate, and two times the volume of the solution of 100% ethanol. The solution was then vortexed, and incubated at -20 °C for 20 minutes. The solution was then centrifuged at 15,000 RPM to pellet the DNA at the bottom of the eppendorf tube. The supernatant was then removed, leaving the pellet. The pellet was then washed with 70% ethanol, and dried. After drying I resuspended the DNA in 15 µl of TE. This still left a large amount of DNA, with only one fragment I was actually interested in. To obtain this fragment I ran the DNA on a gel, in which smaller fragments of DNA pass through the gel matrix faster. The gel matrix contained a compound known as midori green (often called ethidium bromide in the United States) which caused DNA to fluoresce under ultraviolet light. This means that when I exposed the gel to ultraviolet light I could cut out the section of gel that contained the fragment of DNA I was interested in. I then purified the section of DNA from the gel using a kit, which essentially involved dissolving the gel and centrifuging the DNA out. I then ligated the strand of DNA into a preexisting plasmid, which left me with a product I could insert into a bacterial cell.

The next step involved transforming the plasmid into a bacterial cell, transforming in the sense meaning to get the plasmid into the bacteria. This is done with Calcium Chloride and a heat gradient. While the exact mechanisms of this are not truly known, calcium chloride is added to a solution containing the bacteria and the plasmid. The bacteria are then incubated on ice for 30 minutes, and then quickly added to a warm 37 °C water bath in order to create a thermal gradient. The thermal gradient then forces the plasmid into the bacteria. The bacteria are then cultured on a LB media containing ampicillin, an antibiotic. The ampicillin resistance was conferred in the transformed plasmid, ensuring that all bacteria that grow on the media contain the transformed plasmid. After being allowed to grow overnight colonies from the LB media were chosen and added to liquid media for additional growth. Choosing one colony for each liquid media tube ensures that all bacteria present are clones of each other, as each colony originated from a single bacteria.

The bacteria grown in liquid media then needed to be tested to ensure that they contained the gene we wished to mutate. To do this I first pelleted the bacteria via a centrifuge, and then removed all the LB media. The cells were then resuspended in Tris, and lysed open with NaOH and SDS. Everything other than the DNA was then precipitated and pelleted via centrifuge using a solution called P3. 500 µl was then added to 100% ethanol and incubated at -20 °C for 15 minutes. This solution was then centrifuged at 15,000 RPM for 15 minutes to pellet the DNA. The supernatant was then removed, the pellet washed with 70% ethanol, and then dried. The pellet was then resuspended in 50 µl of TE. This entire process left me with just the plasmids, which I could then test to see if they contained the correct DNA sequence. To do this I removed 2 µl of the TE solution, and digested it with two restriction enzymes chosen for their ability to create unique DNA fragments I could detect on a gel. I then ran a gel to see if the correct fragments were present, which if they were would confirm that the tested sample contained the necessary plasmid for the targeted mutagenesis.

This method proved very unsucessful, both before I arrived and during my work here. Amongst hundreds of trials we were never actually able to create the desired plasmid. Due to the selective media and controls, we knew that the bacteria had acquired the ampicillin resistance gene, indicated the transformation had been a success. However none of those transformed ampicillin resistance plasmids also contained the gene of interest. The most obvious problem step would be the ligation of the gene of interest into the plasmid. If the desired DNA fragment had not been produced via the PCR before this step I would not of been able to remove and purify it from the gel, and all the steps after this rely on conferred antibiotic resistance. However it is also unlikely that amongst hundreds of trials that the gene of interest was never successfully ligated into a plasmid.

The main theory I have involving the failure to generate the desired plasmid involves toxic byproducts caused by the recombinant plasmid. Due to the fact that the ampicillin gene is needed for survival on selective growth media the gene must be expressed. The genes of interest lie downstream of the ampicillin resistance gene, and therefore could also be expressed alongside the ampicillin resistance gene. If the protein created by the gene was toxic to the bacteria, whenever ampicillin resistance was expressed it would also kill the bacteria. This would explain why bacterial colonies that selectively grew on the media never contained the gene of interest, the only bacteria that could survive would be those that contained an ampicillin resistance gene which did not contain the gene of interest. It would also explain the low growth rates, with low colony numbers relative to other examples of conferred antibiotic resistance via transformation.

There are several possible solutions and changes in protocol that could be employed to attempt to circumvent this problem. The easiest would be to change the growth conditions be lowering the concentration of antibiotic in the media and/or lowering the growth rate of the bacteria by lowering the growth temperature. This would only work if the protein generated by the gene of interest was only mildly toxic to the bacteria. The reduced environmental stress on the bacteria would reduce gene transcription, and lowered antibiotic concentrations could reduce the need for the expression of the ampicillin resistance gene. These lowered levels of the toxic protein could allow the bacteria to survive its expression. I would expect to see several larger colonies on the growth media which only contained the antibiotic resistance gene and several smaller colonies which contained the desired plasmid.

Another possible solution would be to change the initial plasmid being used. Many of these plasmids do not contain strong terminator sequences, or contain additional promoter regions which could trigger the transcription of the toxic protein. There are many plasmids available for purchase which would all but guarantee no transcription of anything past the ampicillin resistance gene. We could also attempt to insert a strong terminator into the recombinant plasmid, but this introduces additional steps which could introduce additional uncertainty and error. The main downside of this plan is it could involve ordering additional plasmids. Additionally the new plasmid might not contain the cut sites present in the original plasmid, which would require designing and ordering new primers. However, given the large number of commercially available plasmids it is likely that one could be found which worked with the original primers.

I really enjoyed my time in Dr. Fleury's lab. Being in a situation where language between me and other researchers was very limited forced me to learn each step intimately, as I could not easily ask questions. The lab also forced me to practice my sterile protocol, which at the beginning was sloppy. Being a lab that studies fungus means that there is ample opportunity for contamination, and I accidentally contaminated a small jar of LB I was using early on in my work. It seems that for the most part a lot of the techniques used here are nearly identical to the ones used in the United States. There are a few small tricks I picked up, like the versatile uses of pipette tips, which I really like. I am not sure exactly what I expected coming into it, but this lab experience was very similar to my experiences in the United States,

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STEM Research – France

Nicholas Stover

Research

Beginning May 14th, 2016 I began my participation in a study abroad mission that took me to Angers France. My particular program examined virtual reality applications as they pertain to the development of enhanced building information modeling applications. It has been an exciting opportunity because of my background with technology in the building sciences and sustainability applications. What drew me to the program was the fact that visualization is an exceptionally difficult aspect to convey to people when it comes to anything dealing with the anatomy of a building. We are also reaching a point in development of building information modeling, or BIM, where the next logical step is to have a fully immersive environment, and virtual reality represents that step.

I was tasked with developing a model from which we had to create an interactive simulation to illustrate what potential might exist with the built environment. I accomplished this through the use of open source programming, specifically Sketchup and Unity 3D. Starting with Sketchup I was able to create an office setting to which, when finished, I exported the file to Unity using an FBX structure. From there I had to work at developing my knowledge of Unity, in that I had no prior experience in how it worked or it was capable of. I learned it is a powerful tool with the versatility to meet any need in a virtual environment. Though I was not able to get far into the interactivity aspects of programming, I was beginning to unearth what the program could do. Concurrently what I was planning on trying to accomplish was to examine how to program the model to account for building performance issues. To elaborate, what aspects I had mind were to look at thermal performance to understand how buildings lose heat, what can be done to improve building performance, and as a consequence reduce energy demand for said aspect. The overarching consequence of this aspect would mean reduced environmental impact in such a way that hydrocarbons would be in less demand or potentially eliminated with other cleaner sources supplanting fossil fuel use.

Cultural Development

All the while this was going on, the trip represented an opportunity to develop an understanding of a different culture, in this case the French culture. It has been a phenomenally good time, wherein I have been able to make some connections with French students and I hope to develop those connections going forward. I particularly enjoyed a couple times in which we went to the local pub, that is, pubs that weren't necessarily for tourists. It was to be able to enjoy something from the perspective of native French folks.

I also enjoyed getting to see several castles in the area. I have always been a fan of castles, in large part because of their history. On the first day of being in Angers, we saw the Cheateau D'Angers. It's a phenomenally old castle that was around during the days of Augustus Caesar, and was incidentally a place that he was at during one period of history. As part of our activities, we travelled a bit around the region. Most notably I saw Nantes, the city of Jules Verne. It's a phenomenally beautiful city, with a lone tower reaching up 37 stories into the sky. I was very happy to be able to see the top and get a panoramic view of the entire city. I've included an excerpt of one of my journals to include some detail I recorded about Nantes to better illustrate what the city is like: "We meandered through doing the tourist thing with the local chateau being first on our tour. It's another gorgeous example of long standing architecture…Once done there, we took off to what's called Les Machines de l'ile --- it's an exhibit started in honor of Jules Verne in order to attempt to make some of his visions reality. The exhibit is a prime example of technological innovation that can be very creative. We saw a number of different artifacts --- a giant robotic elephant, a giant spider, and several other things." Also of interest, my people from ISTIA, the engineering school, saw a couple examples of real world applications of work that was influenced by the University of Angers. The following is an excerpt quoted from my journal entry describing the visit: "The day after returning to Angers, Michel took the group from ISTIA on a tour to a couple of sites --- a business development incubator, structured as what's called a maker space, but far more sophisticated. It's a really neat concept because what we saw is an open source manufacturing setup that anyone can use for a nominal fee. It has a small scale manufacturing center that incorporates 3D printing, and numerous other technologies. It's what they refer to as their prototyping center, where product ideas can be tested and if they meet quality assurance, they can move into production stage. After this, we saw a collaborative work environment, what can be described as something like a micro business park that has multiple small businesses in operation under one roof. It's called WeForge, and it seems to be a successful model --- based on the tour that the admin gave us, most of the space was taken with more businesses starting up as of the tour." Being that this paper is being completed prior to departure, I will also be visiting Paris before returning home, and I am very excited for it. Paris a world class gem with a phenomenal amount of history, and I cannot wait to experience it.

Conclusion

After working for the past several weeks, I can say that this has been an unforgettable opportunity, and to be paid for it no less. I have enjoyed being able to develop a new marketable skill that I can take with me into practice after I graduate. I have enjoyed being able to meet new people, and make some international connections. I have enjoyed being able to take in the French countryside. I am grateful for the opportunity to have a part in this process, and being that this is the first year of the group having this adventure; I would call it a considerable success. I conclude by saying I hope the program becomes a permanent fixture between Appalachian State and the University of Angers.

STEM Research

Kati Jean VanEtten

Over the course of the last two months I have been involved in the STEM Research Program as well as nine other students from Appalachian State University. Throughout my STEM Research abroad I have learned a plethora about my research topic, French culture, and my own personal strengths and weaknesses. This learning opportunity has been made possible with the support from my professors at Appalachian State University, University of Angers, and the French Embassy.

While living in France I participated in research with the Biology Department at the University of Anger working under Professor Emmanuel Geslin. Professor Geslin asked me to assist her in the research she was currently working on; Coselmar Project. The Coselmar Project's goal is to study and better understand benthic foraminifera. Foraminifera are single-celled protozoans with a calcareous or agglutinated shell that are used as a tool to assess ecological quality of marine waters. They feed off protozoans, small metazoans, and micro-algae, particularly diatoms. Foraminifera are becoming very widely studied by researchers and scientists all over the world. Foraminifera are ubiquitous, influenced by chemical and physical processes, abundant and small, have short reproductive cycle and rapid growth, and are easily preserved by the shell; all characteristics that make studying foraminifera realistic and logical. By studying the hydrological sedimentation process, organic matter, and redox reaction occurring within the foraminifera scientists can make conclusions and observations about the temperature, salinity, and solar radiance that was present during certain periods of time in history. My task in the lab was to complete the washing and picking of a sample from the Coselmar Project. On the very first day I was given a sample of sediment containing foraminifera from a mudflat off the Bay of Bourgneuf. Little did I know that this little sample was part of a much larger story. This story starts with Professor Geslin proposing the question, "Will anthropogenic changes affect the foraminifera and microbenthos on the mudflat?" Professor Geslin hypothesized that the destruction of the oyster bed would negatively impact the foraminifera. She created an experiment that involved burning a mudflat to destruct oyster beds on the bay. Her goal was to conclude how foraminifera will respond to the destruction of the oysters. She began by taking samples from the undisturbed mudflat to create a baseline for her data. She then used hay to create a fire to burn the mudflat and destroy the oyster beds. Post samples were collected and are currently in the progress of being studied and observed. My role in the lab was to sort and organize a sample taken after the burn. The first step to accomplish was taking the vile of sediment stained with rose Bengal stain and "washing" it. This is a simple term for a tedious process. First the sample had to be recorded in the lab notebook and four different viles had to be labeled based of grain size. I learned very quickly that labeling all containers and documentation was very important! The sediment is then poured over 4 sieves that are stacked on top of one another containing different sized screens that go from course to fine, from top to bottom. Each screen is washed using pressurized water and a paint brush. I had to be very careful not to lose sample and that each wash was thorough. After each sieve is washed, the sediment that is caught within the screen is poured into its designated vile. I was assigned to pick and study the grain size ranging from 150-315µm. Due to the size of sediment, I spent most of my time looking through a microscope, picking out four specific foraminifera that were present in the mudflat; Haynesina germanica, Ammonia tepida, Elphidium excavatum, and Ammotium salsum. Using a picking tool (also known as a glorified paint brush), I had to identify foraminiferas from other sediment particles based on characteristics such as shape, symmetry, and pattern. The rose Bengal stain helped me identify which foraminifera were alive by coloring them with a bright, pink color. Once I picked them from the plate under the microscope, I organized them based on species in the cell. I learned very quickly that picking foraminifera was a very time consuming task that took a lot of patience. I found inspiration knowing that the sample I was working on was a part of a larger picture; scientific discovery! Professor Geslin informed me that the foraminifera Ammontium salsum was a new species that became present after the burn. Her results opposed her original hypothesis. Instead of the foraminifera being negatively impacted by the burn, they increased in biomass and apparition of a new species! This may have been due to the change of quantity and quality of organic matter in the intertidal mudflat. Another significant moment of inspiration for me was the last week of research. The University of Anger was hosting The Micropalaeontological Society Conference. Professors and Master Students came from all over the world to present their research over the span of a week. I was very surprised to see the amount of people that were studying foraminifera and their passion for their work.

Every country has a culture unique to its location and people. The French culture has different traditions, foods, and values that have left quite the impression on me. One of my favorite memories that I will take away from my experience at Anger is eating lunch at lab. French people really value lunch and they use it as a time to enjoy one another's company and share food memories. Lunch usually spans about two hours and many times either professors or students brought in baked goods or candies that they got from their travels. (I introduced peanut butter no-bake cookies and rice krispey treats to the French lab) One tradition that remained consistent throughout my experience was having everyone in the lab take turns getting chocolate bars to share every day at lunch. I think it was really special how the professors purposefully interacted and got to know their students on a personal level. Not only does our lab take lunch seriously, but most French stores and shops close for two hours during the afternoon to take their lunch break. I envy this because I think the overall mentality of the United States is very fast paced and they overlook this valuable opportunity. Having this lunch break seemed to result in students and employees being more productive and an overall increase in happiness. Another aspect of culture that France evidently valued was physical activity. Miles of continuous bike trails were implemented along the river along with bike lanes on the road with bike stop lights. A mile from our dorm room there was a workout park that featured equipment and running/bike loops. I also witnessed a unique community within Anger during my visit. Every Saturday in Anger there was a huge farmers market with homegrown fruits and vegetables, meats, desserts, etc. Also many events took place such as Tout Angers Bouge, Music Festival, and free concerts on the river. People that live here are really proud of their town and express their feeling of connection towards Anger.

After self-reflecting on my experience of researching at the University of Anger and living in a France for two month, I have learned a lot about myself. I have learned that life can be a continuous game of curveballs. Typically circumstances change unexpectantly and things do not go as planned. Making the best of these situations can be difficult, but are very rewarding in the end. I think that this is an important concept that takes courage and determination to conquer. The day before I left for France I lost my phone. This increased the nervousness and stress I was already experiencing. Half my brain thought; "it's a sign, I shouldn't be doing this!" The other half said,"worse things have happened to you Kati; find a solution!" It ended up that I found a phone to borrow while I have been here and have been able to skype and call my family! While I was in Anger, many opportunities presented themselves that instantly pushed me outside my comfort zone. For example going to a get -together with all French people attending. Although this may seem minor, having a language barrier can be uncomfortable. I quickly learned that many of them spoke decent English and would go out of their way to include you in conversation. I also became involved in weekly Zumba classes. Walking into a room where everyone already knows one another and you are the outsider can be quite nerve-wracking, but I wouldn't have traded my experience in Zumba classes for anything! Within a couple classes I had a friend that happily helped translate between the instructor and I and many other friends that included me in their conversation and activities outside of class. Although these obstacles seemed painful at the time, I have grown as an individual through them and have acquired skills that I will need for the rest of my lifetime. Overall my experiences in France have been far from my expectations; they have exceeded them.