Biology Department Presents:
The Beaker October 2017

University of Portland

Chair's Corner

With the relaunch of the Biology Newsletter, *The Beak*er, I would like to introduce myself as the Biology Department Chair and to welcome you into our disciplinary program. On behalf of the Bio faculty, some of the best Teacher-Scholars UP has to offer, we want you to know that our first and most important goal is to do our best to help you learn about the biological discipline and acquire the skills and abilities you will need in your future careers and lives.

At this point, we are well into the fall semester. As students, you are pulled in many different directions by many activities that have the potential to be life changing experiences. I encourage you to explore all that an undergraduate education at UP has to offer. It can open doors for you, some of which you may not have considered. I also encourage caution in keeping the "big picture" in mind regarding who you want to be as a person and become as a professional. Although you are preparing for your future, you should also remember to experience today and live in the moment. Be open to challenges, wonderment, and inquiry. Knowledge can empower you, but only if you use it to make life and our world better for all life forms. Hopefully, what you read in our Newsletter will provide you with some ideas and opportunities for reflection. We want your time here on the Bluff to be empowering but also fun and memorable.

-Dr. Ahern-Rindell

Pollentia Summer Research: Discovering History to the Bone *by Kai Seely*

University of Portland biology professor Dr. Amelia Ahern-Rindell never thought that her professional career would bring her to an archeological excavation site on the other side of the world. But then, she received an email from Fr. Richard Rutherford asking her and her undergraduate research group to travel to Spain and participate in the excavation of the ancient Roman city of Pollentia, on the Mediterranean island of Mallorca.

Fr. Rutherford was originally invited to Pollentia by Dr. Miguel Angel Cau Ontiveros, the director of the excavation site. Fr. Rutherford's invitation, which was based on his interest in early Christian communities and baptisteries during the Late Antique period, was recently extended to include a larger research team from UP: The University of Portland Pollentia Undergraduate Research Expedition (or UP PURE, for short). This interdisciplinary team, co-led by Fr. Rutherford, Professor Emeritus and Dr. Ronda Bard of the UP Chemistry Department, has included engineers, environmental scientists, chemists, theologians, and yes, biologists.

In Pollentia, the UP PURE team utilizes its wide variety of skills to help answer questions raised by the findings at the excavation site. The chief question concerns the ancient population that has been exhumed from the city's necropolises. The remains from numerous individuals have been radiocarbon dated to approximately 800-1,200 C.E., a period of Muslim control on the island. Curiously, these individuals were buried in a non-Muslim (and potentially Christian) manner—on their backs with their arms crossed. The UP PURE team therefore seeks to help determine whether these individuals were Christian and, if they were, how they managed to maintain their faith and practices in a community dominated by Muslims.

But why would Fr. Rutherford invite Dr. Ahern-Rindell, a geneticist by training, to join UP PURE? What information could DNA analysis possibly provide about the ancient population of Pollentia? Quite a bit, it turns out. Once extracted, DNA from ancient sources can be used to construct lineages and establish relationships between multiple individuals. Because it is inherited directly from one's father and does not undergo recombination during meiosis, the Y chromosome is particularly informative and enables an individual's direct paternal lineage to be traced.

From left to right: Dr. Ahern-Rindell, Raluca Gosman, Kai Seely, Michalah Leffler, and Philip Blatt

One such form of evaluation is Y chromosomal short tandem repeat (Y-STR) analysis. As the acronym implies, STRs are regions in which a short DNA sequence motif is repeated several times. Importantly, these sites are polymorphic for repeat number; that is, different individuals (and populations) have different numbers of repeats. By sequencing these Y-STR loci, counting the number of repeats at each locus, and pooling the data, researchers can assign an individual to a Y chromosomal haplotype. These haplotypes, which essentially are branches on the Y chromosomal phylogenetic tree, are geographically distributed around the globe. Y-STR analysis, therefore, allows geneticists to establish the geographic origins of an individual's paternal lineage. When applied to the ancient population of Pollentia, Y-STR analysis offers clues as to where the exhumed non-Muslim population came from and how they came to be in Pollentia.

After a literature review of Y-STR analysis and its potential benefit to UP PURE and the Pollentia excavation, Dr. Ahern-Rindell accepted Fr. Rutherford's generous invitation and travelled to the site for a month in the summer of 2016. She was accompanied by her four undergraduate research students: Philip Blatt, Raluca Gosman, Michalah Leffler, and Kai Seely. In Pollentia, this "Team DNA" worked in the dig site and selected suitable bones for exportation to the UP DNA Lab for Y-STR analysis. Recently, Dr. Ahern-Rindell received exciting news: the remains had been approved for exportation by the Spanish government and would soon arrive in Portland. Although Y-STR analysis is methodologically challenging, especially when working with DNA from ancient sources, Dr. Ahern-Rindell is confident she and her research group can successfully analyze the ancient population of Pollentia and begin to answer who these people were, how they arrived, and how they maintained their Christian faith, in the ancient city.

Interested in Undergraduate Research But Not Quite Sure How to Get Started?

By Halle Brady

Undergraduate Research (UR) is working and collaborating with a faculty member on their own research. There are lab and non-lab components as well as learning situations to develop new skills both inside and outside the research environment. In the biology discipline, research is a huge part of learning no matter what your post-graduation plans are. Whether you are a freshman or have been at UP a few years, it might be useful to have some helpful tips on how to get started in research on and off campus.

A student can start as early as the second semester of their freshman year on campus and apply as early as their freshmen spring semester for off campus research in the summer and if nearby continue in the fall. Students don't need to have any previous research experience and professors are very accommodating to those new to a discipline. Some students have even done research that is not directly related to their major to expand their boundaries. For example, one may do computer analysis research as a biology major. You might say there's room for cross pollination.

So what if you feel like research isn't part of your career goals? Chances are you will still find value being involved in research. In the professional sense, you get to experience a chance to get to know a professor/faculty member better who might be willing to write letters for you for jobs or graduate applications. In another sense, research is a way to help you discern your career interests. It can aid you in developing your planning and organizational skills. Research is a validation process.

So now you are ready to start researching, but what is the first step? Get involved in your classes. Introduce yourself to your professors, go to their office hours, and ask them about their research—many will gladly share with you. When you find something that is interesting to you, ask professors if they are looking for students to help with their research. Sometimes it is just that easy. Other professors may have a simple application process that can vary from just listing facts about yourself to the classes you have taken (most professors only recommend introductory courses). If applying for off campus research, the application materials may require a cover letter, letter of recommendations, and a resume (CV). Some will have multiple research opportunities like an REU—Research Experience for Undergraduates—which is a National Science Foundation (NSF) program that might have you choose an opportunity based on location and type of research.

There is no reason to feel overwhelmed. There are plenty of opportunities to get help. There is the Student Opportunity Center that is free for all UP students. Just drop in the office in BC 114. Dr. Orr, Assistant Provost for Undergraduate Scholarly Engagement loves to help students get involved and will assist you with your cover letter. You can ask your professors and the Learning Commons to read over essays too. You can even set up your own account, which is through the Student Opportunity Center website, to help you sort through the national database for the type of research you are looking for.

https://sites.up.edu/upbeat/student-opportunity-center-undergraduate-research-resource-for-students/.

You can find more information at
UP Biology Website
https://college.up.edu/biology/

Learning Commons BC 163
https://www.up.edu/learningcommons/index.html

Some research positions include being paid, receiving a stipend for travel, or having housing provided. With an REU there are various stipends depending on the research area. There are also other fellowship and grants available that can be found here https://www.nsf.gov/crssprgm/reu/

"We are willing to help even in the things that aren't specifically associated with this office (BC 114). We work with [students] to help figure out their direction." -Dr. Orr

Tanzania Research: Into the Mighty Jungle *by Kai Seely*

This past winter break, twelve lucky University of Portland students took an once-in-a-lifetime trip to Tanzania, Africa. They were accompanied by two UP professors, Dr. Tara Prestholdt of the Biology Department and Dr. Vail Fletcher of the Communication Studies Department, who both completed research for part of their Ph.D. theses in East Africa. The students spent two weeks exploring stunning National Parks, investigating the ecological and evolutionary relationships between native animals, learning about the social impact of ecotourism, and experiencing a culture much different than their own.

To maximize their time in Tanzania, the group packed as many activities into each day as possible. The guides' greetings of, "jambo, jambo!" would wake the students for breakfast around 6:00 am. The bulk of their days were spent observing animals in Tanzania's many National Parks and Wildlife Refuges. The students focused on identifying animals' various evolutionary adaptations and ecological roles. In this way, the experience reinforced concepts learned in the traditional UP biology curriculum, especially those found in the ecology and evolution courses. In the evening, the group would discuss several social issues that impact Tanzania, including the legacy of colonialism, the impact of ecotourism, and the rigidly hierarchical and patriarchal nature of the society.

In preparation for this amazing trip, the students were required to complete a six-credit course co-taught by Drs. Prestholdt and Fletcher. The course had three major focuses: ecology and evolutionary biology, the social climate of Tanzania, and the basics of ecotourism and its impact on Tanzanian society. In this way, the students were able to gain insight on several important issues through the different lenses of biology and social science. This emphasis on interdisciplinary education is highlighted by the diverse group of students who took the course and went on the trip: among the twelve students, seven different majors were represented.

Dr. Prestholdt's goals for the course and trip were not solely to educate students on evolutionary biology and the social climate of Tanzania, however. Much more importantly, she wanted to give the students a unique international and interdisciplinary experience that will have a profound, life-long impact on them. She hopes it will encourage students to become global citizens who respect and understand the importance of maintaining cultural diversity in a world that is becoming increasingly

connected and interdependent. Several of the students agreed that the trip changed their perspectives on different cultures and will stay with them the rest of their lives. (They insist they also had a bit of fun along the way.)

Even though she is still reading through objective assessment material, Dr. Prestholdt believes the experience was an unmitigated success and wants to repeat it in the future. At the moment, she is planning to offer the class in the fall of 2018 and travel to Tanzania that winter break. She encourages all interested students, regardless of major, to apply for the course and trip by next spring. Dr. Prestholdt hopes that this broad, inclusive, and interdisciplinary educational experience will continue to be one of the most unique (and popular) opportunities offered by the University of Portland and its faculty.

Upcoming Events

Biology Club: T-shirt Design, winner gets a free t-shirt Due Friday November 3
Send questions and designs to Enya O'Kane at okane18@up.edu

Online Registration Dates:

Seniors	Monday Nov. 6, and Tuesday Nov. 7
Juniors	Wednesday Nov. 8, and Thursday Nov. 9
Sophomores	Sunday Nov. 12, and Monday Nov. 13
Freshmen	Tuesday Nov. 14, and Wednesday Nov. 15

Bio majors and faculty, if you have any newsletter ideas please feel free to submit them to Halle Brady at bradyh18@up.edu