

UW College of Agriculture and Natural Resources
Global Perspectives Grant Program
Project Report Instructions

A brief written report must be submitted electronically to the AES office **within one month of returning from your trip**. Photographs supplementing the report are encouraged and are appreciated by the donor. Failure to submit a report may jeopardize future funding from AES. In addition to forwarding these reports to our benefactor, reports will also be published on the AES website. Reports must be written in a style **understandable by the lay person** and may be edited for readability before being published to the AES website and in the University of Wyoming Foundation report.

Format: Use 12 point type, single line spacing, and one inch margins. Submit your report to aes@uwyo.edu as a PDF file.

Include the following information:

1. COVER PAGE

Award Period (e.g. Spring 2012): Spring 2015

Principle Investigator(s) Naomi Ward **Department:** Molecular Biology/Botany

Email: nlward@uwyo.edu

Project Title from Application: Building U.S.-European Collaborative PVC Research

Amount spent: \$3137

Non-technical summary (max 1500 characters plus spaces): Provide a one paragraph non-technical summary that most people can understand.

PVC (Planctomycetes-Verrucomicrobia-Chlamydiae) bacteria are a group of emerging agricultural/ecological, medical, and biotechnological importance. Due to the recent retirement of US researchers, the current strength of the field lies in Europe. In order to re-build the US PVC research community, it is essential for US researchers to establish and maintain collaborative relationships with their European counterparts. The science objectives of this Global Perspectives-funded project were to develop a closer working relationship between my research group and the group of Damien Devos (Spain), and to conduct intensive collaborative writing (research proposals and papers). We have met these objectives through writing and submission of two proposals to two funding agencies in 2015. Both proposals were selected, based on scientific merit, to advance to full proposal submission. Neither proposal was funded in the first round, but we are resubmitting revised proposals in 2016. In the meantime, we have used existing resources to establish a collaborative research project; the first original research manuscript arising from this collaboration is in preparation and will be submitted Summer, 2016. The internationalization objectives included raising awareness at CABD (the Spanish host institute) of research and education opportunities in the UW Department of Molecular Biology (College of Agriculture). This objective was met through delivery of two invited research seminars by the PI (Ward), and discussion of the interdisciplinary UW MCLS PhD program with Spanish students.

2. REPORT:

Main results of activities planned in the proposal

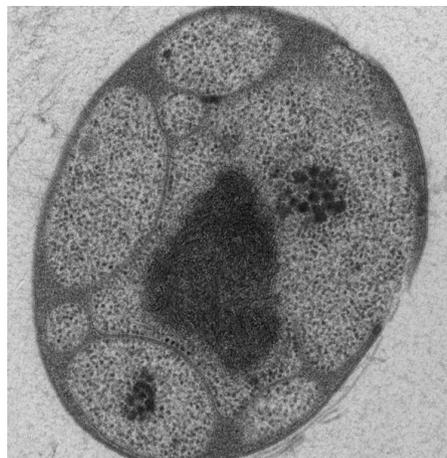


Centro Andaluz de Biología del Desarrollo (CABD; the Andalusian Center for Developmental Biology), in Sevilla, Spain. The CABD was created in 2003 as the first Developmental Biology Institute in Spain. (www.csic.es)

Research Outcomes. The PI spent 10 days visiting the research group of Dr Damien Devos (CABD, Sevilla, Spain; see picture at left) in January, 2015. Dr Devos set aside this time to work collaboratively with Dr Ward on proposal development. This resulted in submission of a preproposal to the U.S. National Science Foundation (NSF) during Dr Ward's visit. Based on its scientific merit, the proposal was later selected to advance to full proposal stage, which occurs with only 25% of proposals submitted to this program. The full proposal was submitted in August, 2015. It received positive reviews but was not selected for funding. During the visit, Drs Ward and Devos also

prepared a proposal for the international Human Frontiers in Science Program (HFSP), which was submitted in March 2015. This proposal also advanced to the full-proposal stage, but was eventually declined. The proposals also involved cross-college interdisciplinary collaborations with two other UW faculty who participated as Co-PIs : Dr Franco Basile (Chemistry) and Dr Harvey Hix (Philosophy; Creative Writing program). Dr Hix contributed Broader Impacts aspects of the NSF proposal.

The project for which these two funding attempts were made concerns the presence of sterols in the PVC bacteria. Sterols are essential components of all eukaryotic cells (found in e.g., humans, animals, plants, and fungi). Although bacteria possess their own sterol-like molecules (hopanoids), a few bacterial species also produce sterols, for reasons that are not understood. This suggests evolution of completely novel sterol-associated functions. The overall goal of our project is to determine the functional role and evolutionary origin of sterols in PVC bacteria. Most of our work is done in the PVC species *Gemmata obscuriglobus* (see picture at right), the only bacterium in which sterols are known to be essential.



Gemmata obscuriglobus, is the only bacterial species in which sterols are essential. We hypothesize that they contribute to the complex membranes that subdivide this cell. (Gottshall et al., 2014; PNAS)

Despite initial difficulties in securing funding, the Ward, Devos, and Basile groups have continued to work on this project, based on the strong collaborative relationship developed as a result of the Global Perspectives funding. This has contributed to the training of a UW PhD student (Ekaterina Gottshall; Molecular and Cellular Life Sciences PhD, graduated Spring 2015), a CABD graduate student (Juan-Carlos Gonzalez), several conference presentations,

and a collaborative original research paper that is currently in preparation and will be submitted Summer, 2016. Additionally, three additional grant proposals have been submitted, strengthened by preliminary data obtained from the project in 2015/2016. These include resubmission of a preproposal to the NSF in January 2016, and submission of a full R01 proposal to the U.S. National Institutes of Health in February 2016. Lastly, the project was selected by the UW Office of Research and Economic Development as one of two UW proposals to the U.S.-based Keck Foundation; Phase I submission was completed in April, 2016.

Education/internationalization outcomes. The PI has raised awareness at CABD of research and education opportunities in the UW Department of Molecular Biology (College of Agriculture), firstly through delivery of two invited research seminars. With the help of her Spanish coordinator, she also held discussions with Spanish students (from the Universidad de Pablo Olavide (UPO), with which the CABD is affiliated) about the interdisciplinary UW MCLS PhD program. Subsequently, although there have been expressions of interest in the MCLS program from UPO students, there have been no formal applications to the program. The PI and her collaborator will continue to promote the program in Sevilla. Lastly, the collaborative visit led to the PI's participation as a keynote speaker in a PVC research conference held June, 2015 in Carmona, Spain, organized by Dr Devos.

Future plans. Beyond submission of the first original research paper, the collaboration established with Global Perspectives support will continue, as both groups expand their focus on bacterial sterols from *Gemmata obscuriglobus* to other members of the PVC group. The Devos group is employing their expertise in computational biology to predict active sterol synthesis in PVC members, and the Ward group is testing these predictions in the lab. This work is being carried out by Sean Stettner, a new MCLS PhD student in the Ward group. It is anticipated that the continuing collaboration will lead to at least one additional peer-reviewed paper. Our attempts to secure funding for the project will also continue.

Potential impacts. Our major project goal of securing grant funding for our research collaboration aligns with one of the identified strengths of the College, namely a strong ethic of attracting outside funds to support research. Additionally, our training of two PhD students to date, and the inclusion of graduate student recruitment activities in the 2015 visit, support the College's focus on maintaining and enhancing the production of PhD-level scholars. The project is contributing to internationalization at UW by establishing a new international collaborative research partnership; attempting to secure external funding which will lead to inter-institutional partnerships; and potentially recruiting Spanish graduate students to the Molecular and Cellular Life Sciences PhD program.

QUESTIONS? Contact Joanne Newcomb in the Agricultural Experiment Station office at aes@uwyo.edu or (307) 766-3667.