



ANNUAL REPORT: June 1, 2013 – May 31, 2014
(i.e., Summer 2013, AY 2013-2014)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: William A. Powell

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

| Course No. | Title | Credit Hrs. | No. Students | No. of Lab. Sections |
|------------|-------|----------------|-----------------|-------------------------|
|------------|-------|----------------|-----------------|-------------------------|

SUMMER:

FALL:

| | | | | |
|--------|-------------------------|---|-----|---|
| EFB307 | Principles of Genetics | 3 | 190 | |
| EFB307 | Genetics Lab | 1 | 200 | 9 |
| BTC132 | Orientation Seminar:BTC | 1 | 18 | |

SPRING:

| | | | | |
|--------|---------------------|---|----|---|
| BTC425 | Plant Biotechnology | 3 | 12 | 1 |
| EFB625 | Plant Biotechnology | 3 | 3 | 1 |

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

| Course No. | Title | Credit Hrs. | No. Students |
|------------|------------------------------|----------------|-----------------|
| EFB298 | Research Internship/EFB | 2 | 1 |
| EFB420 | Internships in EFB | 3 | 1 |
| BTC420 | Internships in Biotechnology | 15 | 4 |
| EFB498 | Research Problems/EFB | 9 | 3 |
| BTC498 | Research Problems/Biotech | 20 | 6 |
| EFB899 | Masters Thesis Research | 18 | 3 |
| EFB999 | Dissertation Research | 2 | 1 |

3. Continuing Education and Extension (short courses, workshops, etc.)

Hosted 6 High School interns over the summer: Bethany Regan, Jennifer DeRosa, Meg Lovier, Clara Miller, Elizabeth Lane, & Colby Buell (see Eagle News Online – “Skaneateles high school students get hands on experience in SUNY ESF lab” <http://www.eaglenewsonline.com/news/2013/oct/02/skaneateles-high-school-students-get-hands-experie/>)

4. Guest Lecture Activities

| <u>Course No.</u> | <u>Title</u> | <u>No. of Lectures</u> |
|-------------------|------------------------------|------------------------|
| EFB132 | Freshman Orientation Seminar | 2 |

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor 24 and unofficial advisor 59 (as coordinator of Biotechnology major)

B. Graduate Students: (Name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

MAJOR PROFESSOR

1. Kristen Russell Steward, MPS, started August 2010, completed May 2014
2. Dale R. Warner, MS, started August 2012.

CO-MAJOR PROFESSOR

1. Allison Oakes, PhD, (with Dr. Maynard), started May 2009

MEMBER, STEERING COMMITTEE (other than those listed above)

1. Oluwafunmilayo (Funmi) Adego Afelumo, MS, started Jan 2013
2. Amanda G. Gray, MS, started Aug. 2013
3. Rie Iriyama, MS, started Aug. 2011
4. Justin C. McMullen, MS, started Jan. 2013
5. Wenjun Cai, PhD, started May 2011

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

1. Adam Hoffman (PhD candidacy exam, Examiner)
2. Daniela I. Manushevich (PhD candidacy exam chair)

III. RESEARCH COMPLETED OR UNDERWAY

A. Departmental Research (unsupported, boot-legged; title - % time spent)

Continuing research to develop DED and Elm Yellows resistant American elm. Currently unfunded. Approximately 1% of time.

Research using *Bacillus amyloliquifaciens* isolated as a lab contaminate but proved to inhibit fungal growth. This preliminary research lead to a seed grant mentioned in next section. Approximately 1% of time.

B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)

1. SUNY-RF Seed grant program, Protecting Trees from Diseases with *Bacillus amyloliquifaciens*. \$8,000 (5/13/13-5/12/14). PI with Dr. Maynard and Andy Newhouse Co-PIs.
2. The New York Chapter of The American Chestnut Foundation. Getting Events in the Ground and Tested. \$210,000 (8/1/12-7/31/15). Co-PI with Dr. Maynard as PI.
3. **New.** Forest Health Initiative. Phase II: Base Funding Level - Transgenic American Chestnut. \$87,500 (1/1/14 – 12/31/15) PI with Dr. Maynard Co-PI (extension of last year's grant of equal amount. Possible extension next year)
4. USDA-Biotechnology Risk Assessment Grant program (BRAG), Evaluating Environmental Impacts Of Maturing Transgenic American Chestnut Trees Relative To Chestnut Trees Produced By Conventional Breeding. \$500,000 (9/1/12-8/31/14 – no cost extension to 8/31/15). PI with co-PIs, Dr. Maynard, Dr. Parry, Dr. Briggs, Dr. Nowak, and Dr Tschaplinski (ORNL)

The grants below have ended this year

5. The New York Chapter of The American Chestnut Foundation. Supplemental grant for technician support for Chestnut research. \$20,000 (1/1/11-12/31/13). PI with Dr. Maynard as co-PI. **Ended this period**
6. ArborGen LLC. Transformation of American chestnut with genes encoding transcription factors. \$20,000 (1/1/11-12/31/13) PI with Dr. Maynard as Co-PI. Another year of 10 years of support beginning in 2002 totaling \$500,000. **Ended this period**
7. The New York Chapter of The American Chestnut Foundation. Regenerating Transformation Events into Whole Plants and Expansion of Field Trials. \$300,000 (5/08-12/31/13). Co-PI with Dr. Maynard, PI. This is in addition to the grant above. It will support a technician in Dr. Maynard's lab, a summer graduate student in my lab, and hourly undergraduate students for field research. **Ended this period**
8. The American chestnut Foundation. Preservation and multiplication of elite backcross American chestnut hybrids by micropropagation. \$2,700 (9/1/12 – 10/1/13) Allison Oakes PI, myself and Dr. Maynard Co-PIs. **Ended this period**

Atypical funding: The American Chestnut Foundation (TACF) has committed to raising \$2.65M over the next five years for our chestnut research entitled **Producing Restoration American Chestnut Trees for the Public**. This is not guaranteed funding as a typical grant, but they are making headway with the following:

\$20,000 donated by an individual donor in the Fall of 2013.

\$75,000 given to TACF by Monsanto has been passed on to us with expectation of further funds in the future.

\$250,000 has been committed by a donor (\$50K per year) which will start July 1, 2014

smaller donations totaling a few thousand dollars have also been received.

We are also working with the ESF development office to raise \$1.0M in donations to expand our research to include not only the American chestnut but other threatened trees, thereby setting up a Forest Biotechnology Center at SUNY-ESF. This is still in development and no funds have been received to date.

2. Research Proposals pending (include information as in B.1., above).

1. USDA AFRI NIFA. Does enhancing resistance to *Cryphonectria parasitica* in transgenic American chestnut affect its interactions with other microbes? \$500,000. 10/1/14-9/30/17. PI with Dr. Maynard and Steve Jeffers Co-PIs

3. Research Proposals submitted, but rejected (include information as in B.1, above)
 1. USDA AFRI. Elucidating the Mechanism for Enhanced Pathogen Resistance in American Chestnut Using an Oxalate Oxidase Transgene. \$500,000. 10/1/13-9/30/16. PI with Dr. Maynard Co-PI
 2. USDA AFRI. Identification of genes and alleles for disease resistance in *Castanea* spp. - subcontract: chestnut transformations. \$100,000. 10/1/13-2/28/15. PI with Dr. Maynard Co-PI
 3. NSRC pre-proposal. Increasing genetic diversity of American chestnut with enhanced blight resistance as a prelude to restoring biodiversity in our forest. \$142,773. 7/1/14 – 6/30/16. PI with Dr. Maynard Co-PI
 4. McIntire-Stennis pre-proposal. One Tree Saving Another: Using the American chestnut to Restore the American elm. \$90,000, 8/1/14 – 7/31/17. PI with Charles Maynard and Allison Oakes as Co-PIs
 5. **Tree fund grant.** Rescuing surviving American chestnut genotypes while propagating American chestnut with enhance blight resistance. \$10,000. 10/1/14-9/30/15. PI

IV. PUBLICATIONS (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- **do not list manuscripts in preparation**).

A. Refereed Publications

Peer reviewed journals:

Newhouse, AE, LD McGuigan, KA Baier, KE Valletta, WH Rottmann, TJ Tschaplinski, CA Maynard, **WA Powell**. 2014. Transgenic American chestnuts show enhanced blight resistance and transmit the trait to T1 progeny. *Plant Science* (**in press**) <http://dx.doi.org/10.1016/j.plantsci.2014.04.004>. (<http://www.sciencedirect.com/science/article/pii/S016894521400079X>)

Newhouse, AE, JE Spitzer, CA Maynard, **WA Powell**. 2014. Leaf Inoculation Assay as a Rapid Predictor of Chestnut Blight Susceptibility. *Plant Disease* 98:4-9

Nelson, CD, **WA Powell**, CA Maynard, KM Baier, AE Newhouse, SA Merkle, CJ Nairn, L Kong, JE Carlson, C Addo-Quaye, ME Staton, FV Hebard, LL Georgi, AG Abbott, BA Olukolu. 2014. The Forest Health Initiative, American chestnut (*Castanea dentata*) as a Model for Forest Tree Restoration: Biological Research Program. *Acta Hort* 1019:179-190

Zhang B, AD Oakes, AE Newhouse, KM Baier, CA Maynard and **WA Powell**. 2013. A threshold level of oxalate oxidase transgene expression reduces *Cryphonectria parasitica* - induced necrosis in a transgenic American chestnut (*Castanea dentata*) leaf bioassay. *Transgenic Research* 22, Issue 5 (2013), Page 973-982

Book chapter:

Nelson, C.D., **W.A. Powell**, S.A. Merkle, J.E. Carlson, F.V. Hebard, N. Islam-Faridi, M.E. Staton, L. Georgi. 2014. Chestnut. In: K. Ramawat, J.M. Merillon, M.R. Ahuja (eds), *Tree Biotechnology*, Chapter 1. CRC Press, Boca Raton, Florida, USA (accepted, August 2013).

B. Non-refereed Publications

The American Chestnut's Genetic Rebirth, by William Powell, **Scientific American**, March 2014 issue, pages 68-73

Saving our forests from exotic pests and diseases, by William Powell, Post Standard invited Op Ed article, (Sep. 2, 2013)

The Academic Minute (radio and web) – How genetic modification can save trees from pathogens.

Interviews leading to 14 (or possibly more) popular press articles and shows:

New York Times - Like-Minded Rivals Race to Bring Back the Chestnut Tree (July 13, 2013)

Time Warner Cable News - Bicyclists raise money and awareness for tree (August 22, 2013)

Eagle News Online - Skaneateles high school students get hands on experience in SUNY ESF lab (October 2, 2013)

Biology Fortified – What do you want to know about restoring the American Chestnut? (Oct. 8, 2013)

Channel 9 News – SUNY ESF scientists bringing back the American Chestnut tree (October 11, 2013)

The Post Standard/Syracuse.com - William A. Powell, SUNY ESF named Forest Biotechnologist of the Year (Dec. 10, 2013)

Channel 9 Bridge Street – Dr. William Powell named Forest Biotechnologist of the Year (Dec. 11, 2013)

Reason.com - Science, Not Mysticism, Will Save the American Chestnut Tree (December 27, 2013)

Scientific American Web Exclusive - A New Generation of American Chestnut Trees May Redefine America's Forests (March 1, 2014)

The Motley Fool - How Genetic Engineering Can Save the Iconic American Chestnut Tree (March 16, 2014)

The Daily Star - Chestnuts are making a comeback (March 28, 2014)

Wisdom (Forest Guild Publication) – American chestnut: A test case for genetic engineering? (April 2014)

NIFA Newsroom blog - NIFA program helps re-establish the American chestnut tree in the United States (May 5, 2014)

New Scientist – American chestnut set for genetically modified revival (May 30, 2014)

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

Transgenics or Cisgenics, which will save the American chestnut? 5/26/13 – 6/1/13. 2013 Tree Biotechnology Conference hosted by IUFRO. Asheville, NC

American chestnut restoration introduces a new paradigm of transgene introgression to save a keystone species. 6/14/13. BRAG Annual Project Director's Meeting for USDA-NIFA Biotechnology Risk Assessment Grants Program. Washington DC

New tools for saving threatened trees, the American chestnut example. 10/29/14 – 10/30/14. Alliance for Saving Threatened Forests: 2013 Symposium. Asheville, NC

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)

Tour de Trees transgenic American chestnut planting & short presentation, 7/30/13, approximately 100 attended.

Where there be mountains, there be chestnuts. Corning Rotary Club, 8/22/13, approximately 50 attending.

Return of the King. **Dale Travis Lecture Series**, 10/10/13, approximately 300 attended.

American chestnut project presentations, workshops, and field tours, The American Chestnut Foundation, New York chapter's (TACFNY) annual meeting, 10/11/12-10/13/12. Our team organized this meeting at ESF. Approximately 40 attending.

Different Tools, One Goal: A Transgenic Approach to Blight Resistance seminar, leaf assay workshop, and board meeting. National TACF annual meeting. 10/18/14 – 10/19/14. Herndon, VA. Approximately 100 attended.

American Chestnut Research and Restoration Project at SUNY-ESF. National TACF Board meeting. 3/21/14 – 3/22/14. Abington, VA. Approximately 25 attending.

Reviving the American chestnut tree. Voices lecture series, Hudson Valley Community College. 4/2/14. Troy, NY. Approximately 80 attending and posted on the web at: <https://www.youtube.com/watch?v=zaKS04BwaYY>

Moonlighting: Panel discussion on de-extinction (one of three invited panel members). 4/2/14. SUNY-ESF. Approximately 30 attending.

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):
2. Industrial and Commercial Groups, etc.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

Advisor to the NY chapter of The American Chestnut Foundation

Science advisory board member of the national American Chestnut Foundation

VI. PROFESSIONAL DEVELOPMENT

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

2013 **Forest Biotechnologist of the Year** by the Institute of Forest Biotechnology (IFB)

“His peers within the Forest Biotechnology Partnership, an international group of forestry and biotechnology professionals, selected Powell as the fifth scientist to win this award, which recognizes the forest biotechnologist who best exemplifies responsible uses of forest biotechnology and actively promotes science, dialogue and stewardship through his or her work.”

Co-winner of the 2014 SUNY-ESF **Exemplary Researcher Award** (Lifetime Career Achievement) along with Dr. Maynard.

“Documented evidence of outstanding research accomplishments and impact of their work on their discipline. Outstanding national and international recognition in the academic community; evidence of a substantial positive impact of research mentorship through undergraduate students, graduate students, and/or postdoctoral associates.”

B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)

2. Professional Society Membership

American Phytopathological Society

American Association for the Advancement of Science

International Society for Horticultural Science

3. Other Professional Activities

a. Editorial activity

Journal (s)ResponsibilityOther (books, symposia, etc.)

b. Reviewer

Journal(s)No. of manuscripts

European Journal of Plant Pathology

1

Tree Genetics & Genomes

1

Plant Cell Reports

1

AgencyNo. of proposals

McIntire Stennis

1

Other

Lowe-Wilcox/Zabel award student proposals

FCH495 student proposal reviewed for Dr. Greg Boyer

c. Participation (workshops, symposia, etc.)

Name of workshop, etc.DatePlaceC. Further Education/Re-training Undertaken, Leaves, Workshops, etc.D. Foreign Travel (Where, When, Purpose)**VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)**A. Department-level

Coordinator for the undergraduate Biotechnology major

Awards Ceremony: Gave the Distinguished Scholar in Biotechnology and Joseph & Ruth Hasenstab Memorial Scholarship. Took photos of the event for the department.

Represented the Biotechnology major at the Spring Open house.

B. College-level

Director of the Council on Biotechnology in Forestry

IBC (Institutional Biosafety Committee) member

C. University-wide, including Research FoundationD. Foreign Travel (Where, When, Purpose)

VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION.

One paragraph on each of the following (**i.e., three paragraphs total**) would be most helpful: this past year, what have you done for our students, department/college, and self professionally? NOTE: The information in this section (along with the supporting specific information elsewhere in this report) should be your strongest case for being considered for a discretionary raise (when available), which I'll continue to award based on your contributions to the department and college this reporting period.

The most significant accomplishment this year is to prove we have produced blight resistant American chestnut trees. The final supporting evidence came from our small stem assays of the Darling 215 and Darling 311 American chestnuts that showed that our newest transgenic events were as resistant, or possibly more resistant, than the blight resistant Chinese chestnut controls. I made a time-lapse video of the assay and placed it on the web in our updated chestnut website <http://www.esf.edu/chestnut/> and separately on YouTube. The You Tube version has over 1,468 views to date and there are likely as many views on the webpage version. This is fast approaching the number of views of my TEDx talk with has over 6,710 views to date. Our success with the chestnut project has generated a lot of popular press, with at least 14 articles, videos, or radio spots over this year alone. Counting last year, we have averaged one news item per month, helping keep our college in the public eye. I am also getting many invitations to talks and have received very positive feedback from the audience. Several of these news items and talks were initiated my paper published in Scientific American. All of this positive exposure is the result of 24 years of research by Dr. Maynard and myself, which was recognized by our sharing this year's Exemplary Researcher Award and by my being awarded the Forest Biotechnologist of the Year. Even though Chuck and I get the awards, it is a team effort of all our many past and current students, researchers, and colleagues. The production of the first blight resistant American chestnut trees has been recorded in three of the four peer reviewed articles published this year.

The next big step is to bring the trees through the regulatory review process, a costly and time-consuming task. Unlike large corporations, we do not have large budgets and whole departments of people focused just on the regulatory process. But this needs to be done so that the trees can become available to the general public and be planted in our forests. The blight resistant American chestnut trees will challenge the regulators because nobody has ever asked for non-regulated status for a plant that is to be used in forest restoration, as opposed to being just a crop. It is difficult to judge the time that will be needed, but if the process for the chestnut goes as other plants before it, we estimate 3 to 5 years. One problem with the regulatory review is that typical granting agencies will not fund it because this has always been funded by the businesses that would sell their plants for profit. We are proceeding in a not for profit manner, so funding will be a challenge. Fortunately we have worked closely with The American Chestnut Foundation over the years and they are helping raise \$2.65 million over the next 5 years. We currently have \$345,000 committed toward this goal. So we have a good start. We will continue to ask for traditional grants where they can be applied. Our goal is to be sure that the first blight resistant American chestnut trees come from SUNY-ESF.

But we don't want to stop there. With the help of ESF's development office, we are planning a \$1.0M fund raising campaign to go beyond the American chestnut and help save other threatened tree species. My vision is to someday establish a 'Forest Restoration Biotechnology Center' at ESF. With the American chestnut and our initial work with the American elm, we are laying the foundation for this center. To do this, funding will be critical. But also other support from the campus will be needed. The new lab and growth chambers in the Biotech Incubator building is a excellent start and will help us expand. But the next critical need has to do with faculty. We need a plant physiologist! We also need someone to teach the plant tissue culture course as Dr. Maynard nears retirement. EFB could hire a person that would cover both classes, support our current faculty, and help us establish this center. Now is the time to work on this while we have everyone's attention with our success with the American chestnut tree. This window of opportunity will not last forever.

IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2012

a. Course(s) to be offered

I will continue to offer research projects at the graduate and undergraduate levels and plan on having three high school interns.

b. Proposed research activity

I will continue to focus the chestnut research including the new breeding component added last year to increase the genetic diversity of our blight resistance enhanced, transgenic American chestnut trees. I am also meeting with the government regulators (USDA, EPA, and FDA) to determine the best route toward deregulation. We are also holding a meeting with the Forest Health Initiative on July 31 – Aug. 1 to see how they can help.

c. University, professional society, and public service

Same high standards as before.

2. Fall Semester 2011

a. Course(s) to be offered

I hope to be relieved of the BTC132 Freshman seminar, EFB307 Principles of Genetics & EFB308 Genetics Lab so that I can get the regulatory review process started. I plan to have a draft of the 200+ page petition written by the end of the year.

b. Proposed research activity

Same high standards as before focusing on chestnut.

c. University, Professional society, and public service

Same high standards as before.

3. Spring Semester 2012 –

a. Course(s) to be offered

BTC425 and EFB625 Plant Biotechnology

b. Proposed research activity

I will continue all my research as before

c. University, professional society, and public service

as before