

ANNUAL REPORT: June 1, 2012 – May 31, 2013
(i.e., Summer 2012, AY 2012-2013)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: Lee Newman

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
SUMMER:					
No courses taught					
FALL:	BTC 401	Molecular Techniques	4	22	2
	EFB 601	Molecular Techniques	4	3	1
SPRING:	EFB 325	Cell Biology	3	94	0
	BTC 499	Senior Synthesis	1	19	0
	Co-Teach				
	EFB 202	Diversity of Life	3		6

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT.

No classes had a service-learning component

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

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
FALL:	EFB 999	Doctoral Thesis Research		2
	EFB 899	Masters Thesis Research		2
	EFB 495	Undergrad Exp/ College Teaching		3
	EFB 498	Research Problems in Envir. For. Bio		1
	EFB 298	Research Apprenticeship		3
	BTC 498	Research Problems in Biotechnology		10
	BTC 420	Internship in Biotechnology		7
	BTF 298	Research Apprenticeship		1
SPRING:	EFB 999	Doctoral Thesis Research		2
	EFB 899	Masters Thesis Research		4
	EFB 495	Undergrad Exp/ College Teaching		2
	BTC 498	Research Problems in Biotechnology		9
	EFB 498	Research Problems in Envir. For. Bio		4
	EFB 496/796	Phytoremediation		9
	BTC 420	Internship in Biotechnology		1
	EFB 496/796	Cell Biology Recitation		14

3. Continuing Education and Extension (short courses, workshops, etc.)
Co-presented a workshop on Phytoremediation for General Electric

4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
BTC 132	Orientation Seminar	1
EFB 132	Orientation Seminar	1
ENS 132	Orientation Seminar	1

II. STUDENT ADVISING

- A. Number of undergraduates for whom you are the student's official advisor 31 and unofficial advisor 6

Over the past year, I have had 31 undergraduate students for which I serve as academic advisor.

Over the course of the past year I have had 19 undergraduate students (9 of whom I am academic advisors to) who are conducting research in my laboratory:

Beverly Agtuca	Sean Hohm	Shaler Garrett
Joseph Whitaker	Melody Papapietro	Yang Yang
Michael Cook	Funmi Afelumo	Rachel Snyder
Logan Will	Arashdeep Dhillon	Regina Yim
Robert Hamilton	Justin McMullen	Heather Holme
Gabrielle Fanfan	Cherissa Dukelow	Merrick Doddy
Vic Maietta		

- B. Graduate Students: (list 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

Adam Hoffman	PhD	August 2010
Wenjun Cai	MS	August 2011
Funmi Afelumo	MS	January 2013
Justin McMullen	MS	January 2013
Dan Collins	PhD	August 2012
Camille Warner	MS	August 2012

CO-MAJOR PROFESSOR

Co-Advising with Ted Endreny		
Scott Wolcott	PhD	August 2012

MEMBER, STEERING COMMITTEE (other than those listed above)

Allison Oaks
Leticia Izquierdo

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

YunYun Bi
Yenyang Pan
Laura Calendra

III. RESEARCH COMPLETED OR UNDERWAY

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

Safeners and metal toxicity protection	4
Role of plant endophytes on growth promotion	4
Role of P450 genes in TCE degradation	4
We submitted an NSF grant in February for this project.	
Impact of nanoparticles phyllosphere organisms	4
We plan to submit a USDA grant in September for this project.	
Impact of nanoparticles on epidermal symbiotes	4
Horticultural Therapy	8
Wastewater treatment walls	4
Mine site restoration	4

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)

USDA	Nanoparticle Contamination of Agricultural Crop Species	co-PI/PI on ESF
\$1,498,080	\$381,026 \$75,613	Wenjun Cai
	Mar 11-Mar 16	
NASA	Development of Hyperspectral Imaging of Plants to Detect Contamination	PI
\$207,829	\$98,183	Adam Hoffman
	Mar 11-Mar14	
NSF	Plant Uptake and Interaction with Nanoparticles	PI
\$277,907	\$74,878	Justin McMullen
	Sept 08–Sept 13	
Roux Assoc	Treatment Wetlands for TCE Degradation	PI
\$12,000	\$12,000	Camille Warner
	May 13-May 14	

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

Source	Role	Title	Total Amount
NSF	PI	Understanding and Using the Genetic Mechanism for Phytoremediation of Chlorinated Solvents – Environmental and Societal Impacts	\$374,503.00
Center State	PI	Determining Environmental Toxicity of Surfactants	\$24,908

3. Research Proposals submitted, but rejected (include information as in B.1., above)

McIntyre-Stennis	PI	Understanding the Role of Select Endophytic Bacteria in Enhanced Growth and Disease Resistance	\$78,147
NSF	co-PI	INSPIRE preproposal – Scaling the Plant Cell Wall, Extending the Boundaries From Nano to Kilo	

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

1. Lin, W-C, G-p. Chang-Chien, C.M. Koa, **L. Newman**, T.Y. Wong, and J-K. Liu. 2012. Degradation of polychlorinated dibenzo-p-dioxins by *Pseudomonas mendocina* strain NSYSU. Environmental Microbiology Reports. Submitted.
2. Weyens, N., B. Bram, K. Schellingen, R. Ceulemans, D. van der Lelie, **L. Newman**, S, Taghavi, R. Carleer and J. Vangronsveld. 2013. The potential of the Ni-resistant TCE-degrading 1 *Pseudomonas putida* W619-TCE to reduce phytotoxicity and improve phytoremediation efficiency of poplar cuttings on a Ni-TCE co-contamination. International Journal of Phytoremediation. Accepted.
3. *Odom, L.*, J. Burken and **L.A. Newman**. 2013 Distribution and accumulation of trichloroethylene and trichloroacetic acid in hybrid poplars. Ecological Engineering. In Press.
4. Jones, K.W., R. Tappero, J. Wang, Y-c. Chen, Q. Yuan, W. B. Lindquist, L. Crandell, C. A. Peters, W. Um, L. Newman, T. Sabo-Attwood, and C. Moyer. 2013. Tomographic Investigations Relevant to the Rhizosphere. In: "Tomography and Imaging of Soil-Water-Root Processes. 2nd edition", S. H. Anderson and J. W. Hopmans (Editors), Soil Science Society of America. In Press.
5. Henry, H.F., Burken, J.G., Maier, R., **Newman, L.A.**, Rock, S., Schnoor, J.L., and Suk, W.A. 2013. Phytotechnologies - Preventing Exposures, Improving Public Health. International Journal of Phytoremediation. 15:889-899.
6. White, J., De La Torre-Roche, R., Hawthorne, J., Musante, C., Xing, B., **Newman, L.**, Ma, -X. 2013. Impact of Ag Nanoparticle Exposure on p,p'-DDE Bioaccumulation by Cucurbita pepo (Zucchini) and Glycine max (Soybean). Environmental Science and Technology.47:718-725

B. Non-refereed Publications

None at this time

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

(BOLD indicates international venue; Italics indicated Keynote or Plenary talk)

2013

- Advances in Drug Delivery – Mini Plenary talk, Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013
- Phytoremediation: Using plants to solve environmental problems. Air and Waste Management Association of CNY Annual Conference, Syracuse, NY, 18 March 2013.

2012

- *Phytoremediation of Organic Compounds – Metabolic mechanisms to field applications*. 1st International Conference on Contaminated Land, Ecological Assessment and Remediation, **Hangzhou, China**, 5-8 November 2012.
- Plant uptake and translocation of nanoparticles. The 28th Annual Conference on Soils, Sediments, Water and Energy, 15-18 October 2012.
- *How small things (microbes and nanoparticles) impact plant uptake and degradation of environmental pollutants*. 4th International Conference on Soil Pollution and Remediation, SoilRem 2012, **Yantai, China**, 23-26 September 2012.
- *Phytoremediation of organic contaminants*. 107th Congress of the Italian Botanical Society, **Benevento, Italy**, 18-22 September 2012.
- *Phytoremediation: Look how far we've come*. 9th International Phytotechnology Conference, **Hasselt, Belgium**, 11-14 September 2012.

STUDENT AND COLLEAGUE PRESENTATIONS (* denotes oral presentations, student names italicized, bold indicates award won)

2013

- Preliminary Research for GreenWall Treatment of High Strength Organic Wastewater. *K. Glantz, N. Nor Majid, D. Carter, S. Wolcott* and L. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013.
- Bioavailability and genetic toxicity of gold nanoparticles in soils and hydroponic exposures with *Lycopersicon esculentum* (Tomato 'Brandywine'). *B. Agtuca, J. McMullen, W. Ca¹, C. Murphy², J. White, T. Sabo-Attwood* and L. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013. – **Winner, first place student presentation competition.**
- The Effects Of Titanium Dioxide Nanoparticles on Beneficial Human Skin Bacteria. *J. McMullen, A. Dhillon* and L.A. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013.
- Commensalistic Human Skin Bacteria and Their Sensitivity to Silver Nanoparticles Found in Consumer Products. *A.K. Dhillon, M. Doody, J. McMullen, A. Hoffman* and L. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013.
- The potential for safeners to reduce the symptoms of heavy metal toxicity in *Zea mays*. *F. Afelumo, S. Garrett* and L. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013.
- Trichloroethylene Plume Detection using Hyperspectral Imaging. *A. Hoffman, D. Lewis, A. Keith, R. Hamilton, J. McMullen* and L. Newman. Biotechnology Symposium: Building Bridges Between Academia & Industry, Syracuse, NY. 16-17 May 2013.
- Commensalistic Human Skin Bacteria and Their Sensitivity to Silver Nanoparticles Found in Consumer Products. *A.K. Dhillon, M. Doody, J. McMullen, A. Hoffman* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Impact of Mycorrhizal colonization of *Lycopersicon esculentum* on uptake and translocation of nanoparticles. *A. Noori* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Dichlormid as an alleviant for metal toxicity symptoms in *Zea mays*. *S. Garrett, F. Afelumo* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Trichloroethylene Plume Detection using Hyperspectral Imaging. *A. Hoffman, D. Lewis, A. Keith, R. Hamilton, J. McMullen* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013. – **Winner, 3rd Place, Graduate Student Competition.**
- Bioavailability and genetic toxicity of gold nanoparticles in soils and hydroponic exposures with *Lycopersicon esculentum* (Tomato 'Brandywine'). *B. Agtuca, J. McMullen, W. Ca¹, C. Murphy², J. White, T. Sabo-Attwood* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Trichloroethylene Degradation by genetically modified Tobacco (*Nicotiana xanthi*). *R. Hamilton, A. Hoffman, J. Cooke, S. Strycharz* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Remediation of Trichloroethylene in a Wetland Microcosm: the role of Plants and Microbes. *C. Warner, A. Ludlow* and L.A. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Quantifying the Effects of Horticultural Therapy on Spinal Cord Injury Patients. *D. Collins* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Impact of Nanosilver on Trophic Interactions. *G. Fanfan, J.C. Cook* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- The potential for safeners to reduce the symptoms of heavy metal toxicity in *Zea mays*
- *F. Afelumo* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- "Yes, in my back yard. " The potential for Horticultural Therapy in Syracuse, New York . *H. Holmes* and L.A. Newman
- Potential for Ornamental Plants for Food Processed Waste Water Treatment. *J.T. Whitaker, S. Wolcott* and L.A. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- The Effects of Titanium Dioxide Nanoparticles on Commensalistic Human Skin Bacteria. *J. McMullen, S. Hohm, A. Dhillon* and L. Newman. 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.

- Growth Enhancement of Brandywine Tomato by the Endophyte *Enterobacter sp.* 638. *M. Papapietro, A. Hoffman, L. Will, D. van der Lelie, S. Taghavi and L. Newman.* 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.
- Preliminary Research for GreenWall Treatment of High Strength Organic Wastewater. *S. Wolcott, K. Glantz, D. Carter, T. Endreny and L. Newman.* 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013. – **Winner, Honorable Mention, Graduate Student Competition.** Properties and Microbial Community Analysis of Soil from the Tahawus Mine Site. *V. Maietta, G.C. Dukelow and L.A. Newman.* 2013 ESF Spotlight on Research, Syracuse, NY. 10 April 2013.

2012

- *Trichloroethylene Plume Migration Analysis using Hyperspectral Imaging. *A. Hoffman, R. Hamilton, J. McMullen, D. Lewis, A. Keith and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012. – **Winner, first place student presentation competition.**
 - Trichloroethylene Plume Migration Analysis using Hyperspectral Imaging. *A. Hoffman, R. Hamilton, J. McMullen, D. Lewis, A. Keith and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - The Potential for Safeners to Reduce the Symptoms of Heavy Metal Toxicity in *Zea mays*. *F. Afelumo and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012. **Winner, third place student presentation competition.**
 - Gold Nanoparticles Used in *Lycopersicon esculentum* (Tomato ‘Brandywine’) to Study the Toxicity and Genetic Effects in Soils and Hydroponics. *Beverly Agtuca, Wenjun Cai, C. Murphy, J. White, T. Sabo-Attwood and L. Newman,* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - Commensalistic Human Skin Bacteria and Their Sensitivity to Silver Nanoparticles Found in Consumer Products. *A. Dhillon, J. McMullen, A. Hoffman, V. Shah and L. Newman,* SUNYESF. The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - The Effects of Titanium, Zinc, and Gold Nanoparticles on Commensalistic Human Skin Bacteria. *J. McMullen, A. Hoffman, A. Dhillon, and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - Impact of Uncoated Ag NP, Citrate-Coated Ag NP, and Bulk Ag Particles on Tomato Biomass and Transpiration. *W. Cai, Vic Maietta, B. Agtuca, J. White, C. Murphy and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - Study of Mechanism for Plant Growth Promotion Elicited by Bacterial Volatiles in Poplar. *M. Cook, A. Hoffman, D. van der Lelie, S. Taghavi and Lee Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - The Effects of Endophytic Bacteria on The Growth and Regulation of Tomato Plants. *M. Papapietro, M. Cook, R. Hamilton, A. Hoffman, D. van der Lelie, S. Taghavi and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
 - Trichloroethylene Degradation by Genetically Modified Tobacco (*Nicotiana tobaccum* var. *xanthi*). *R. Hamilton, A. Hoffman, J. Cooke, S. Strycharz and L. Newman.* The 28th Annual Conference on Soils, Sediments, Water and Energy, Amherst, MA. 15-18 October 2012.
- D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)
- Phytoremediation: Using plants to solve environmental problems. SUNY Buffalo University, Buffalo, NY, 8 March 2013
 - Plant uptake and interactions with nanoparticles. Binghamton University, Binghamton, NY, 30 November 2012.
 - Environmental Phytotechnologies: Using plants to solve environmental problems. Utica College, Utica, NY 22 October 2012.

- Phytoremediation. FMP Remediation, Utica, NY, 21 August 2012.
- Phytotechnology for addressing environmental problems, a two-day presentation as part of Contaminacion Ambiental y Biorremediacion at the Instituto de Ecologia, **Xalapa, Veracruz, Mexico**, 16-17 August 2012.

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):

None at this time

2. Industrial and Commercial Groups, etc.

None at this time

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

Judge for 11th ESF Environmental Challenge Science Fair, 13 March 2013

Judge for International Genius Olympiad, SUNY Oswego, 26 June 2012

VI. PROFESSIONAL DEVELOPMENT

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

None at this time

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

Association of Environmental Health Sciences – Scientific Advisory Board, organizer for Annual Conference in Amherst, MA

International Phytotechnology Society –Immediate Past President; Chair of Gordon Award Committee, Chair of Educational Award Committee, Member of Organizing Committee for Annual Conference in Hasselt, Belgium, 2012; Chair, Organizing Committee for Annual Conference to be held in Syracuse, NY in October 2013

Chair of Organizing Committee for Biotechnology Research Symposium in May 2013

2. Professional Society Membership

Association of Environmental Health Sciences

International Phytotechnology Society

Northeast Phytoremediation Society

3. Other Professional Activities

a. Editorial activity

Journal (s)

International Journal of Phytoremediation

Responsibility

co-Editor-in-Chief

Other (books, symposia, etc.)

CLEAN 2012 Conference Symposia

Organize papers for publication

Phytoremediation: Management of Environmental Contaminants

Editors: Abid A. Ansari, SS Gill, R Gill, Guy Lanza, and Lee Newman

b. Reviewer

Journal(s)

Journal of Soils and Sediments

No. of manuscripts

1

Chemosphere

1

PLOS One

1

Environmental Science and Technology

1

Ecological Engineering

1

<u>Agency</u>	<u>No. of proposals</u>
ESF Research Committee Seed Grants	5
ESF Research Committee McIntyre Stennis	4

Other

c. Participation (workshops, symposia, etc.)		
<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
Biotechnology Symposium Session Chair	16-17 May 2013	Syracuse, NY
Association for Environmental Health Science, Session Chair	15-18 Oct 2012	Amherst, MA

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

None at this time

D. Foreign Travel (Where, When, Purpose)

Xalapa, Mexico	15-18 August 2012	Present two days of courses on phytoremediation as part of the program of Contaminacion Ambiental y Biorremediacion at the Instituto de Ecologia
Hasselt, Belgium	10-15 Sept 2012	Attend the 9 th International Phytotechnology Conference and present a plenary talk
Benevento, Italy	17-22 Sept 2012	Attend the 107th Congress of the Italian Botanical Society and present a plenary talk
Yantai, China	23-26 Sept 2012	Attend the 4 th International Conference on Soil Pollution and Remediation, SoilRem 2012 and give a plenary talk and a keynote talk
Hangzhou, China	5-8 November 2012	Attend the 1 st International Conference on Contaminated Land, Ecological Assessment and Remediation and give a plenary talk

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

- Course and Curriculum Assessment Committee member.
- Biotechnology Minor development group.
- Core Team Member for the Academic Research Building.
- Fall and Spring Transfer Student Advising
- Participated in the updating of the Natural History and Interpretation major
- Point person for deionized water treatment system
- Member of Toxicology Search Committee
- Lead, committee for replacement of Microbiology faculty position
- Spoke at both EFB and BTC orientation seminars'
- Pre-Med Advisor, Biotechnology Major students
- Chun Wang Award Committee, member

B. College-level

- Member, Committee on Research
- Participated in developing new Environmental Health major
- Curriculum group participant of Environmental Science
- Mentor for Undergraduate Honors and CSTEP programs
- Spoke at Environmental Science Orientation seminar
- Lead in developing MD/PhD program with Upstate Medical University
- Lead in developing NIEHS grant program
- Curriculum group participant of Environmental Science Coupled Natural and Human Systems
- Member of Hill Collaboration Nervous System Group
- Member of Hill Collaboration Cancer Group
- Member of Hill Collaboration Wounded Warrior Group
- Chair, Biotechnology Research Symposium organizing committee

C. University-wide, including Research Foundation

- Member of the SUNY Catalyst Committee for Research

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.

Students:

I have continued to teach the three courses I am required to teach, Cell Biology, Senior Synthesis and Molecular Techniques. The Cell Biology course has been the one I worked the most on, and I feel that it is improving with each time that I teach the course. At the end of the last lecture, I was astonished and honored to have the class stand up and give me a round of applause – that is the first time that has ever happened in my teaching career. It inspires me to work even harder to continue to improve and bring elements to the course to engage the students. I also continue to teach Phytoremediation (EFB496/796). I will discuss this more in the service to the Department and College. This year I also started teaching EFB496/796 Cell Biology Recitation, to go into current research and literature articles on Cell Biology for students who want more depth than I can bring to the Cell Biology Course. This year I have had 27 students in the lab, PhD, MS and undergraduate. Two of my undergraduate researchers stayed on in the lab as MS students, and two other MS students plan to switch to the PhD program. Two students are visiting PhD students, one from Iran and one from Thailand. Both are fitting into the lab very well, and are extremely productive. In addition to these two students, there are two other international students in the lab, one from China and one from Nigeria. The lab also hosts students from a variety of ethnic backgrounds, including Trinidad, Philippines, India, China, and Native America. The lab hosts not only a diversity of nationalities, but also religious and political backgrounds. Several students are or were in the Honors program, and several others are in CSTEP. The best thing about this is how proud the students themselves are of being in this diverse group. The students are extremely hardworking, and this is reflected in the number of awards they have won locally and at internationally attended conferences. Graduate student Adam Hoffman and then undergraduate student were part of a group of ten students I took to the Association for Environmental Health Sciences Annual Conference in Amherst, MA in October 2012, and they won first and third prizes respectively for their presentations. Adam also won third prize, and graduate student Scott Wolcott won honorable mention at the Spotlight on Research completion April 2012, and undergraduate Beverly Agtuca won first prize for student research at the Biotechnology Research Symposium in May 2012. I have continued to assist students to have quality internships, and helped one student have an internship with a USDA researcher in Fresno, CA, two to have internships with the Department Energy, one at Brookhaven National Lab and another one at the National Renewable Energy Lab in Golden, CO. Several had internships with a colleague who is manager of the largest greenroof company in the US, and had the chance to see and take part in installations in Manhattan. Adam Hoffman, my first PhD student at ESF passed his qualifying exam this spring. I continue to work with the students to develop their sense of community by hosting laboratory trips to places that are both fun and educational (Corning Museum of Glass and the Rosamond Gifford Zoo). I also work with the students to develop the importance of community service by participating in a food drive – last year the lab purchased and delivered over \$1600 of food to a local food pantry.

College

I am continuing my work on the departmental Course and Curriculum Assessment Committee, the college Committee on Research, and the SUNY Catalyst Committee. I also continue to participate in three Hill Collaboration groups, Neuroscience, Cancer, and Wounded Warrior. As part of this last group, we have started work with a former ESF graduate, Dr. Stephen Lebduska, who currently serves as the head of the Spinal Cord Injury Unit at the Syracuse Veterans Hospital to develop a Horticultural Therapy program for inpatients in the unit. We are working not only with the hospital, but also with other community groups to obtain the plants and supplies for the program, and we currently have three students working at the VA on this program. I served on the departmental search committee for the new faculty hire in toxicology, and I was recently asked to take the lead on drafting the documents to hire a replacement for an environmental microbiologist. For the second year, I was chair of the organizing committee for the Biotechnology Research Symposium, which continues to attract both academic and industry representatives. This year, I invited as a

plenary speaker Dr. Henry Daniels, who is recognized by the Bill and Melinda Gates Foundation and Nature Biotechnology as the leading scholars worldwide on the production of plant based pharmaceuticals. He has agreed to come back to ESF and give a seminar at the school, for the two of us to try to develop a collaborative research program, and to discuss ESF Biotechnology students to intern in his lab. During the past year in the EFB496/796 Phytoremediation course, I had four speakers give seminars that were open to the college and the public, Dr. Charles Reynolds from the Cold Regions Research and Engineering Laboratory, Dr. Tracy Punshon from Dartmouth College and Dr. Clayton Rugh, manager of Xeroflora, the largest green roof company in the US. The final speaker, Dr. Jerald Schnoor, Editor in Chief for Environmental Science and Technology, and a former EPA Scientific Advisory Board Member, not only agreed to give a talk in the class, but also gave the final Adaptive Peaks Seminar. His talk attracted guests from local industry and Syracuse University. I have recently started working with both ESF and UMU administration to develop and implement a joint MD/PhD program. I have continued to work with the Graduate Admissions office to attract the highest quality of students to ESF, and in this capacity worked the recruiting table at the Brookhaven National Laboratory Graduate Student Fair. Also at BNL, August 2012 I organized the signing of the



Memorandum of Understanding between SUNY, BNL and the Research Foundation, signed by Garrett Sanders of the RF, and Drs Doon Gibbs, Associate Director of BNL (now director) and David Lavelle, SUNY Provost. I also organized a tour of the BNL facility for ESF Provost Dr. Bruce Bongarten and Dr. Lavelle. The following day, I worked with BNL staff to host SUNY Chancellor Nancy Zimpher during her visit to the lab, and her keynote presentation to student researchers at the lab. Chancellor Zimpher met with SUNY students doing research at the lab, and I co-hosted her tour of the lab with Director Sam Aronson, Research Foundation President Dr. Tim Killen, and Michael Frame, Director of Federal Relations.

Self:

I continue as Co-Editor in Chief for the International Phytoremediation Journal, which has continued to increase the number of submissions received every year. The publishers continue to increase the number of issues, and from a quarterly journal we are now have 10 issues a year, and are slated to go to a monthly publication. Our impact factor continues to be strong for a specialized journal, even considering the increasing number of articles published every year. I continued to serve as the Immediate Past President of the International Phytotechnology Society after service 6 years as President. The Society continues to grow and the conferences remain strong every year. I am also the chair of the organizing committee for this year's conference, which will be held in Syracuse in October. I also continue my role on the Scientific Advisory Board for the Association for Environmental Health Sciences. This past year, with travel to Mexico, Belgium, Italy and China I have continued to increase international contacts, with the aim of developing more international collaborations. I also am developing collaborations with colleagues in the Czech Republic and Thailand, and I have been asked to go to Kazakhstan to teach course of biotechnology. I am also working to developing more collaborative ties within the SUNY system, and I am starting to work with new colleagues from SUNY Binghamton (Chemistry Dept) and Buffalo (Engineering) to develop joint research programs. While my publications remain excellent in quality and are published in top journals in my field, I look forward to increasing the number as more graduate students move through the lab. And finally, I recently was asked to join and international team of editors to work on the book Phytoremediation: Management of Environmental Contaminants.

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)

In addition to what is detailed below:

I want to submit more research grants to move more of my students off of teaching assistantships and onto research assistantships. While the TA is definitely beneficial to the student training and the department, allowing students to focus more on their research will ultimately benefit all.

I want to develop the 496/796 Phytoremediation course into a fully listed course, and I want to introduce a Phytotechnology course similar to one I previously taught to be given on alternate years. This new course would outline all the different ways that plants are used by society, and not just focus on the remediation aspects. Additionally, I want to find the time to develop a Phytoremediation/Phytotechnology program at ESF, as the College has everything it needs course-wise to do this – it just requires the organization to make it a reality.

I want to see Plant Physiology actually taught at ESF!

I want to develop the Horticultural therapy program, as this is generating a lot of interest at the VA and in the community, and ESF, the Veterans and the students can benefit from this program. As a part of this, I want to continue to work towards developing Environmental Health programs at ESF in any way I can contribute.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2013

a. Course(s) to be offered

Guest lecture on Phytoremediation at the Institute de Ecologia in Xalapa, Mexico

b. Proposed research activity

Write more grant proposals!

Research activities include the continuation of research projects already underway by graduate and undergraduate students in the laboratory. These include the verification and development of a hyperspectral imaging system to determine exposure of plants to the groundwater contaminant trichloroethylene. Previous work has shown that this will be possible, but we now need to refine and confirm the initial findings. This includes determining how long a plant has to be exposed, and exposure concentration, for detection limitations. We are also working to understand the nature of the signal at a molecular level by developing a 2-D gel electrophoresis system for this analysis. This work is being done by a graduate student and an undergraduate student.

Although TCE phytoremediation is well understood in terrestrial systems, the mechanism of action of TCE remediation in wetlands is still a 'black box.' With support from Roux Associates, and in collaboration with colleagues from Cold Regions Research and Engineering Laboratory and BP Corporation, we are doing research to understand the complimentary roles of abiotic soil processes, soil microbes and plants in TCE wetland remediation. This work is being done by a graduate student supported during the summer by Roux Associates.

We are also looking at plants in vertical systems, where we are studying how treatment walls can be used to treat waste water from brewery operations. We are looking at the efficiency of removal, the role of the plants and biofilm, and also trying to determine if this treatment can be coupled with a production system to not only be an aesthetically pleasing remediation system,

but also potentially produce herbs and microgreens for service in associated restaurants. This work is being done by a graduate and an undergraduate student at ESF, and several undergraduate students at RIT.

We are also continuing research into the beneficial effects of plant endophyte interactions. This includes working with a colleague, George Newcomb, at the University of Idaho into the ability of select endophytes to confer resistance to various fungal pathogens. We are also looking at how, on a genetic level, the endophytes increase growth and productivity in crop plants and biofuel plants. This work is being done by two undergraduate students.

We are also continuing to look at genes that we believe are involved in the degradation pathways for chlorinated solvents, including TCE. We currently have several genetically engineering lines in the laboratory where Arabidopsis genes encoding several different P450 Enzymes have been placed under the control of a strong constitutive promoter and inserted into *Nicotiana xanthi* lines. These will be studied to correlate changes in TCE metabolism with gene expression levels. This work is currently being done by an undergraduate student and a visiting PhD student from Thailand. We submitted an NSF grant in February for this project.

We are continuing to look at the impact of safeners, supposedly inert compounds in pesticide formulations, on toxicity resistance and metal uptake in plants. We are looking at how the safeners up regulate gene expression for stress response elements, and how this might decrease toxicity to heavy metals in plants, and thus allow for increased metal accumulation before plant senescence. This work is currently being done by a graduate and an undergraduate student.

We are looking at how to understand the systems and processes that will result in the most efficient restoration work being done at a mining site in the Adirondacks. With Paul Hai from the AEC, we have collected soils from the mine site, and are doing both physical and microbiological analysis of the soils to determine those characteristics seen at sites with restoration success.

We are also continuing our studies on plant nanoparticle interactions. This work is being done by several graduate and undergraduate students in the laboratory. These studies include, but are not limited to:

The changes in gene expression following nanoparticle exposure

The impact of decreasing concentrations on gene expression variations

The time course of gene expression changes

The impact of different soil types on bioavailability

How size and shape impact uptake and translocation

The metabolic changes in plants following nanoparticle exposure

With Dr. Cathy Murphy of University of Illinois, the impact of soil exposure on nanoparticle chemistry

With Dr. Ryan Tappero at Brookhaven National Laboratory, the three-dimensional tomographic imaging of plants at the synchrotron light source

Understanding how mycorrhizal organisms will impact both uptake and accumulation of nanomaterials in the soil. This work is being done with a visiting PhD student from Iran.

Understanding the accumulation patterns for nanomaterials in insects following ingestion of nanomaterials exposed plants.

With Dr. Vishal Shah at Dowling College, the impact on nanoparticles on commensalistic skin microbes. As many consumer products now contain nanoparticles, understanding the role these exposures have on beneficial microorganism health is critical.

With Medical personnel (doctors and therapists) from the Veterans Affairs hospital, we are developing a horticultural therapy program to benefit patients in the spinal trauma unit. This will include outdoor sensory gardens to increase physical mobility, and plants that stimulate all five senses to help draw out patients also suffering from stroke or Traumatic Brain Injury. Also in the program will be indoor recreational and therapeutic activities to increase patient interactions through the use of plants.

c. University, professional society, and public service

Continue with services as described:

Membership and Service to the International Phytotechnology Society

Planning the 10th International Phytotechnology Society meeting in October 2013 in Syracuse, NY

Co-Editor in Chief for the International Journal of Phytoremediation

Continue to all current committee work

Continuing to work with Drs. Greg Boyer and John Hasset on exploring the potential for ESF to apply to the National Institute of Health to host a Superfund Research Center.

Continue to attend and participate in the open houses and receptions for new incoming freshman and transfer students

Additionally, I want to do the following:

Working to develop a concentration in Phytotechnologies at ESF, with both undergraduate and graduate programs

Work with colleagues at ESF and UME to develop a collaborative MD/PhD program

Serve as the ESF 3+3 Coordinator for the Doctorate in Physical Therapy Program

Work with Colleagues at ESF to develop the MS and PhD degrees in Environmental Health

Work with colleagues at ESF, UME, SU and the VA to develop a concentration in Horticultural Therapy, with a certificate and research program

Continuing work with Drs. Guy Lanza (EFB Adjunct) and Dr. Prayad Pokethitiyook (Biology Department Chair, Mahidol University, Bangkok, Thailand) to develop collaborative research programs between ESF and Mahidol University.

Become more active with local groups, including Syracuse Grows, the LIPA Park Committee, and the local branch of the Sierra Club

Make more contacts with local environmental firms, as well as the central New York regulators, both federal and state to learn more about the regional environmental issues

Continue to work to develop programs with Roux Associates, Xeroflora International, Alcoa Corporation and the Corps of Engineering CRREL Laboratory that will enhance research and internship opportunities for ESF faculty and students

Continue to work with faculty and administrators at ESF and other SUNY campuses, and Brookhaven National Laboratory to develop research and training opportunities that benefit both SUNY and BNL.

2. Fall Semester 2013

a. Course(s) to be offered

BTC401/EFB601 Molecular Biology Techniques
EFB496/796 Plant Physiology Recitation
BTC420 Internship in Biotechnology
BTC/EFB298 Research Apprenticeship
BTC/EFB498 Undergraduate Research
EFB495 Undergrad Exp/ College Teaching
EFB899 Masters Thesis Research
EFB999 Doctoral Thesis Research

b. Proposed research activity

See above

c. University, Professional society, and public service

See above

3. Spring Semester 2014

a. Course(s) to be offered

EFB325 Cell Biolog
EFB496/796 Cell Biology Recitation
EFBxxx Phytoremediation
BTC499 Senior Synthesis
EFB202 Diversity of Life (co-teach)
BTC420 Internship in Biotechnology
BTC/EFB298 Research Apprenticeship
BTC/EFB498 Undergraduate Research
EFB495 Undergrad Exp/ College Teaching
EFB899 Masters Thesis Research
EFB999 Doctoral Thesis Research

b. Proposed research activity

See above

c. University, professional society, and public service

See above