ANNUAL REPORT: June 1, 2015 – May 31, 2016
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: Lee Newman

I. INSTRUCTIONAL ACTIVITIES

1. Regular Course Offerings

	Course No.	Title	Credit Hrs.	No. Students	No. of Lab. Sections
SUMMER:	No courses taught				
FALL:	BTC 401	Molecular Techniques	4	18	2
	EFB 601	Molecular Techniques	4	4	1
SPRING:	EFB 325	Cell Biology	3	73	0
	BTC 499	Senior Synthesis	1	15	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)

	Course No.	Title	Credit Hrs.	No. Students
FALL:	BTC 298	Research Apprenticeship		2
	BTC 420	Internship in Biotechnology		6
	BTC 498	Research Problems in Biotechnology		7
	EFB 298	Research Apprenticeship		1
	EFB 495	Undergrad Exp/ College Teaching		4
	EFB496/796	Plant Physiology Recitation		5
	EFB 498	Research Problems in Env. For. Bio.		2
	EFB 798	Research Problems in Envir. and For. Bio.		1
	EFB 899	Master's Thesis Research		3
	EFB 999	Doctoral Thesis Research		5
	EHS 420	Internship in Environmental Health		1
SPRING:	BTC 298	Research Apprenticeship		1
	BTC 420	Internship in Biotechnology		6
	BTC 498	Research Problems in Biotechnology		7
	EFB 420	Internship in Envir. For. Bio		1
	EFB 495	Undergrad Exp/ College Teaching		3
	EFB 496/796	Phytoremediation		20
	EFB 496/796	Cell Biology Recitation		5
	EFB 498	Research Problems in Envir. For. Bio		2
	EFB 899	Master's Thesis Research		2
	EFB 999	Doctoral Thesis Research		5

3. Continuing Education and Extension (short courses, workshops, etc.)
None at this time

4. Guest Lecture Activities

Course No.	Title	No. of Lectures
BTC 132	Orientation Seminar	1
EFB 132	Orientation Seminar	1
ENS 132	Orientation Seminar	1
LSA 433/644	Planting Design and Practice	1

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor __73___ and unofficial advisor _____
Over the course of the past year I have had 36 undergraduate students (18 of whom I am academic advisors to) who are conducting research in my laboratory:

Marissa Lanzatella	Molly Devlin	Nathaniel Morse
Jonathon Peralta	Kai Troge	Chet Lynch
Haley MacDougall	Emily Taff	Felicia Natale
Andrew Collyer	Thomas Bronk	Xueqing Xiong
Julie Snyder	Kyna Sanchez	Nadia Abuqube
Laura Sorenson	Nicholas Stosiek	Ashley Adler
Christina Collins	Joshua Crane	Quinn Searles
Cameron Schiavone	James Capanegro	Susie Tran
Seham Al-Masri	Paul Risteff	Rachel Christman
Jacob Choi	Ethan Appelgren	Keenan Porter
Hanna Quigley	Tiara Ogus	Miranda Clardulli
Alex Kirschner	David Voytovich	Madison Aldrich

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	PhD	August 2011		
Justin McMullen	MS	January 2013		
Dan Collins	PhD	August 2012		
Camille Warner	PhD	August 2012		
Ashley Pirovano	PhD	August 2014		
Gabrielle Fanfan	MS	January 2013		
Charlotti Atti	MS	August 2014		
Funmi Afelumo	MS	January 2013	August 2015	The Effects of Herbicide Safener Naphthalic Anhydride on Nickel Toxicity in Corn

CO-MAJOR PROFESSOR

Co-Advising with Ted Endreny
Scott Wolcott PhD August 2012
Co-Advising with Donald Leopold
Jessica Saville PhD August 2013

VISTING STUDENTS

None at this time

MEMBER, STEERING COMMITTEE (other than those listed above)

GRADUATED

Allison Oaks
Grete Bader
Hangan Li

CURRENT

Jiangeng Wen	Vernon Coffey
Brandon Haynes	Thomas Frontera
Joshua Harris	Brandon Haynes
Joseph Shoytush	Ryan Scheel

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Leanne Kirschen Chair

***C. Post Graduates

POST DOCTORAL FELLOW

Azam Nori	Tarbiat Modares University	Iran

VISITING SCHOLAR

Ruilian Sun	Shandong University	China
Toemthip Poolpak	Mahidol University	Thailand

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 crop production	4
Role of P450 genes in TCE degradation	4
We submitted an NSF grant in February for this project. We plan to resubmit	
Impact of nanoparticles phyllosphere organisms	4
Impact of nanoparticles on epidermal symbiotes	2
Horticultural therapy	8
Wastewater treatment walls	4
Mine site restoration	4
Reuse of biological waste on the ISS and Mars mission for food production	4
Use of hyperspectral imaging for plant health on ISS	2
Use of treatment wetlands to remove pharmaceutical compounds	2
Use of treatment wetlands to removed TCE from surface water	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)*

US Department of Agriculture; Nanoparticle Contamination of Agricultural Crop Species; $1,498,080; Mar 2011 to Mar 2016; JC White, X. Ma, L Newman and B. Xing; PhD. student Wenjun Cai supported.

National Aeronautics and Space Administration; Development of Hyperspectral Imaging of Plants to Detect Contamination; $355,509; March 2011 to Jan 2017; current year $32,268 ;L Newman; PhD. student Adam Hoffman supported.

Gifford Foundation; Construction Funds for Horticultural Therapy; $1000; June 2013 to Sept 2016; L. Newman.

American Legion Ladies Auxillary; Funds for Horticultural Therapy; $2500; May 2013 to open ended; L. Newman.

USDA McIntire-Stennis Program through ESF; Understanding the Role of Select Endophytic Bacteria in Enhanced Growth and Disease Resistance; $53,847, current year $22,673; June 2014 to August 2016; L. Newman; PhD. student Ashley Pirovano supported.

ESF Seed Grant; Isolation of Genetic Promoters to Increase Production of Plant-Based Biopharmaceuticals; $7,000; April 2015 to December 2016; L. Newman.

FMC; Elucidating the Mechanisms of Biopesticide Induced Plant Pathogen Resistance; $54,284; January 2015 to December 2015; L. Newman; Post Doc Azam Noori supported.

US-Russia University Partnership Program (UPP) Eurasia Foundation; Modernizing Graduate Education at the University of Tyumen; $39,515; April 2016 to December 2016. L. Newman and G. Lanza

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

Hill Collaboration Grant; Quantifying the Effects of a Therapeutic Horticulture Program on Veterans in Central New York; $9,500; L Newman and A. Landis.

New York City Parks; Randall Island Remediation and Restoration; $5000; L. Newman

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

National Science Foundation; Understanding and Using the Genetic Mechanism for Phytoremediation of Chlorinated Solvents Environmental and Societal Impacts; $372,364; L. Newman and E. Folta

National Science Foundation; Linked Lives: Building Sustainable Communities through Shared Linked Data; $331,559; R. Cream, B. Haikes, C. Hall, M. Heckert, L. Newman

National Science Foundation; Nano-Bio Phenomena and Processes in the Environment; $375,127; L. Newman

IV. PUBLICATIONS

A. Refereed Publications

1. De la Torre Roche, R., A. Servin, J. Hawthorne, B. Xing, L.A. Newman, X. Ma, G. Chen and J.C. White. 2015. Terrestrial trophic transfer of bulk and nanoparticle La_2O_3 does not depend on particle size. Environmental Science and Technology. Vol49: 11866-11874**.**

2. Noori, A., H.Z. Maivan, E. Alale, and L.A. Newman. 2015. Leucanthemum vulgare Lam. crude oil phytoremediation. International Journal of Phytoremediation. On Line: ISSN: 1522-6514; DOI: 10.1080/15226514.2015.1045122.

3. Noori, A., J.C. White and L.A. Newman. 2016. Mychorrhizal fungi influence silver uptake and membrane protein gene expression following silver nanoparticle exposure. Journal of Nanoparticle Research. Submitted.

B. Non-refereed Publications
None at this time

C. Papers Presented at Science Meetings (give title, date, occasion, and location)
The Gordon Award. 27-30 Sept 2015. 12th International Phytotechnologies Conference, Manhattan, Kansas.

Student and Post-Doc Presentations (student and post-doc names italicized)
Oral Presentation:

Mycorrhizal Lycopersicon esculentum aquaporin gene expression and physiological response to silver nanoparticles. *A. Noori*, J.C. White and L.A, Newman. 27-30 Sept 2015. 12th International Phytotechnologies Conference. Manhattan, Kansas.

Quantifying the Effects of HT on Military Veterans in Central New York. *D. Collins*, J. Schneider, H. Holmes, B. Ross, L. Messano, A. Landes, S.Lebduska and L. Newman. 8-10 October 2015. American Horticultural Therapy Association National Conference. Portland, Oregon.

Leucanthemum vulgare Flavonoid Content during Crude Oil Phytoremediation. *A. Noori*, H. Z. Maivan, E. Alaie, and L.A. Newman. 19-20 May 2016. 8th Annual Biotechnology Symposium. Syracuse, New York.

Poster Presentations:

Elucidating the Mechanisms of Biopesticide Induced Plant Pathogen Resistance. *A. Noori*, S. Taghavi, D. van der Lelie, and L.A. Newman. 26-30 July 2015. Plant Biology 2015. Minneapolis, Minnesota.

***Understanding the Role of Enterobacter sp. 638 in the Growth Enhancement of Poplar and Willow Trees. A. Pirovano and L. Newman. 19-22 October 2015. 31st Annual International Conference on Soils, Sediments, Water and Energy. Amherst. Massachusetts. Won 2nd place in Student Competition.

***A Proposed Study of Phytodegradation and Enhanced Microbial Degredation of Trenbolone Metabolites in Wetland Systems. C. Atti and L. Newman. 19-22 October 2015. 31st Annual International Conference on Soils, Sediments, Water and Energy. Amherst. Massachusetts. Won 3rd place in Student Competition.

***Elucidating Mechanisms of Biopesticide Induced Plant Pathogen Resistance for *Bacillus* Species. A. Noori, S. Taghavi, D. van der Lelie and L.A. Newman. 19-20 May 2016. 8th Annual Biotechnology Symposium. Syracuse, New York. Won 2nd place in Student Competition.

***Understanding the Role of Enterobacter sp. 638 in the Growth Enhancement of Poplar and Willow Trees. A. Pirovano and L. Newman. 19-20 May 2016. 8th Annual Biotechnology Symposium. Syracuse, New York. Won 1st place in Student Competition.

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. New York City Parks8 January 2016. Approximately 75 attending

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 International Genius Olympiad, SUNY Oswego, 16 June 2015

Multiple Roles for Clear Path for Veterans, Chittenango, NY

- Strategic Planning Committee
- Property Committee
- Kitchen garden design, installation and maintenance
- Natural Play area design

Director of Horticultural Therapy Program, Syracuse Veterans Administration Hospital

Director of Horticultural Therapy Program, Brookdale of Manlius, an Alzheimer care facility

Development of CERES program to bring food and nutritional information to veterans dealing with cancer

Consultant, New York City Parks

VI. PROFESSIONAL DEVELOPMENT

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

2015 President's Award for Community Service

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 held in Amherst, MA, October, 2015 and to be held in October 2016

International Phytotechnology Society –Founding President; Chair of Gordon Award Committee, Chair of Educational Committee, Chair of Outstanding Professional Member Committee, Member of Organizing Committee for Annual Conference in Manhattan Kansas; Organizing Committee for Annual Conference held in Manhattan, Kansas, 2015; Organizing Committee for Annual Conference to be held in Hangzhou, China, 2016.

Chair of Organizing Committee for Biotechnology Research Symposium to be held in May 2016 in Syracuse, NY and to be held in May 2017.

2. Professional Society Membership

Association of Environmental Health Sciences
International Phytotechnology Society
Northeast Phytoremediation Society
American Society of Microbiology
American Chemical Society

3. Other Professional Activities

a. Editorial activity

Journal (s)	Responsibility
International Journal of Phytoremediation	co-Editor-in-Chief

Other (books, symposia, etc.)

Phytoremediation: Management of Environmental Contaminants vols. III and IV in production	Editors: Abid A. Ansari, SS Gill, R Gill, Guy Lanza, and Lee Newman

Other (books, symposia, etc.)

None at this time

b. Reviewer

Journal(s)	No. of manuscripts
Ecological Engineering	2
Journal of Water and Health	1
PLOS ONE	1
Journal of Environmental Quality	1
Chemosphere	1
Journal of Agriculture and Food Chemistry	1
Environmental Science and Technology	1
Ecotoxicology and Environmental Safety	3
Agency	**No. of proposals**
ESF Research Committee Seed Grants	6
ESF Research Committee McIntyre Stennis	4

c. Participation (workshops, symposia, etc.)

Name of workshop, etc.	Date	Place
2016 Biotechnology Symposium Symposium Session Chair	19-20 May 2016	Syracuse, NY

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

None at this time

D. Foreign Travel (Where, When, Purpose)

None at this time

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

- Course and Curriculum Assessment Committee member.
- Core Team Member for the Academic Research Building.
- Fall and Spring Transfer Student Advising
- Point person for deionized water treatment system
- Member, Environmental Epidemiologist Faculty Search Committee
- Spoke at EFB and BTC orientation seminars
- Pre-Med Advisor, Environmental Biology students
- Chun Wang Award Committee, member
- Tenure and Promotion Committee

B. College-level

- Member, Environmental Chemistry Faculty Search Committee
- Member, Committee on Research
- Coordinator, 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
- Advisor, 3 + 3 Doctor of Physical Therapy Program
- Lead in developing NIEHS grant program
- Curriculum group participant of Environmental Science Coupled Natural and Human Systems
- Coordinator, Environmental Science's Health and the Environment focus area
- 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
- Supervisor, Environmental Health/Environmental Medicine Biotechnology Core Facility
- Advisor: Food Security minor
- Advisor: Environmental Health minor
- Lead, in developing 2+2 joint diploma programs with Mahidol University, Bangkok, Thailand, in the majors of Environmental Biology, Biotechnology and Environmental Health
- Developing a collaborative program between Environmental Health group and the NYS Department of Health at the Wadsworth Center in Albany

C. University-wide, including Research Foundation

- COIL participant
- Development of SUNY/Brookhaven National Lab Research and education collaborations
- Developing a collaborative program between the Environmental Health group, and the University of Albany Department of Environmental Health

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.

Students:
I have continued to teach the three required courses, Cell Biology, Senior Synthesis and Molecular Techniques. I taught the Phytoremediation course (EFB496/796) as a three credit course this year, and it was well received by the students who liked the expanded format. I will discuss this more in the service to the Department and College. I taught the EFB496/796 Cell Biology Recitation again this year. The students again said that they greatly enjoyed the course and they learned valuable skills in both reading and understanding research articles, as well as presentation skills. I also taught the EFB496/796 Plant Physiology Recitation this year. I plan to continue to teach this course, but have it focus on different areas of plant physiology every year so that students can take the course more than once and continue to learn new material with each time the course runs. Last year, the course focused on plant stress responses. I also continue to co-teach Biodiversity II, with the topic area of Procaryotes. It is a fun lecture series, and the students seem to enjoy it and ask a lot of good questions. This year I have had 36 undergraduate students in the lab, 7 PhD, 4 MS students, two post-docs and one visiting scientist. The two post-docs were from Iran and Thailand, the visiting scientist from China. In addition, there are/were 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, and China. 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 hard working, and this is reflected in the number of awards they have won locally and at internationally attended conferences. 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 $1800 of food to a local food pantry and over $400 to support a local pet food pantry.

Department/College/SUNY
I am continuing my work on the departmental Course and Curriculum Assessment Committee and the Tenure and Promotion Committee, and the college Committee on Research. I also continue to participate in three Hill Collaboration groups, Neuroscience, Cancer, and Wounded Warrior. As part of this last group, we are working for the third year 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 on 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 a PhD student who is doing this work for his dissertation project, two graduate students and eleven undergraduate students working at the VA on this program. The program involves growing plants

on a rooftop garden, in room plants for patients, maintaining plants in common areas, and devising enrichment programs involving gardens and plants for the patients during the winter months. We are also working with Clear Path for Vets to develop a kitchen garden for their Culinary Command program. I have had 5 students from Landscape Architecture and Environmental Science working with me to design the kitchen garden, and also a natural playground. I was a member of the departmental search committee for the new faculty hire in Environmental Health/Epidemiology, and a Chemistry department search committee for the new faculty hire in Environmental Health/Environmental Chemistry. For the fifth year, I was chair of the organizing committee for the Biotechnology Research Symposium, which continues to attract both academic and industry representatives. During the past year in the EFB496/796 Phytoremediation course, I had two speakers give seminars that were open to the college and the public, Dr. Marinus Otte, Professor in Biological Sciences, and former Chair, at North Dakota State University and Dr. Gary Banuelos, a world renowned research with the USDA in Fresno, CA. I am still working with the administration at Brookhaven National Laboratory and the Research Foundation to forward the major goals of the MOU, which was to increase research collaborations between SUNY and BNL. I have also been working with faculty and staff at ESF to develop a series of course, to be taught at BNL, which would benefit high school teachers and allow them to earn ESF credits. I have been working with Dr. Shannon to develop a joint diploma program with Mahidol University in Bangkok, Thailand for the Environmental Biology, Biotechnology, Bioprocess Engineering and Environmental Health majors. This program would allow students from Mahidol University to do their last two academic years here at ESF, and then receive diplomas from both ESF and MU. As the program develops, ESF students would also be able to go to MU for a semester or academic year to participate in an international learning program. In this vein, I am still working with the SUNY COIL program to develop a jointly-taught course with the University of Parma, where students at both universities would take a phytoremediation course, and run joint literature review projects between the two universities. I continue my involvement in the ESF heath related programs. I have continued working with both ESF and UMU administration to develop and implement a joint MD/PhD program, and this is moving forward. I am the Pre Health Advisor for students in the Environmental Biology Major. I am also the ESF advisor for students wishing to participate in the UMU 3+3 program to earn a Doctor of Physical Therapy degree. I am also the Coordinator for the Health and the Environment option in Environmental Science, and the Coordinator for Environmental Health, where I am not only doing curriculum coordination, but also updating the web site and promotional materials for students, administrators and fund raising, and worked with Dr. Luzadis on developing descriptions for new faculty hires for the program as well as recruiting new ESF faculty to participate in the program. I am the advisor for two new minors, Environmental Health and Food Studies. This past year I was a member of two search committees for a new hires in Environmental Biology and Chemistry, to teach in the Environmental Health program (Epidemiology and Environmental Chemistry). I also reorganized the plan sheet for the major, and course descriptions for four undergraduate courses. I also oversaw the set up of $650,000 of equipment for the Environmental Health/Environmental Medicine Biotechnology center, and currently supervise the management of the laboratory for use by ESF, Upstate Medical University and the Biotechnology Accelerator personnel.

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 publish 12 issues a year, in the 8.5 x 11 page format. For the fourth year in a row, our annual and 5-year impact factor continues increase and be strong for a highly specialized journal, being in the upper 50% for all Environmental journals. I continued to serve as the Founding President of the International Phytotechnology Society after serving 6 years as President. The Society continues to grow and the conferences remain strong every year. I was on the organizing committee for last year’s conference, which was held in Manhattan, Kansaa, in October 2015. I continue to chair both the Awards Committee and the Education Committees for the Society. I also continued my role on the Scientific Advisory Board member for the Association for Environmental Health Sciences. I am also working to developing more collaborative ties within the SUNY system, and I am starting to work with colleagues from SUNY Upstate and SUNY University of Albany to develop joint research programs. Last year, I submitted a grant as PI with collaborators from SUNY Upstate. We are still waiting results. 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 continue to work with an international team of editors to work on the books Phytoremediation: Management of Environmental Contaminants; we are working on Volumes III and IV. And finally, in the past year I received the President's Award for Community Service, for the work we are

doing in the lab both with the veteran community and for getting students involved in assisting the local food banks and animal care.

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 continue 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.

Unfinished from last year, I want to develop both the 496/796 Phytoremediation course and the EFB 496/796 Cell Biology Recitation into fully listed courses, 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. I want to develop the BTC499 Senior Synthesis course into a two credit course, to have the time to work more with students to develop their presentation and writing skills. New this year, I want to develop a graduate level Cell Biology course, to meet the needs of the graduate student population.

I would still like 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 continue 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.

With the Environmental Health Program, I will be working to develop the MPS, MS and PhD programs to attract both graduate students and professional members of the Health community into the program.

I am working with S. Shannon to develop Public Health minor with Syracuse University, which would be available for all students, not only the Environmental Health and Environmental Studies students.

Work with Mahidol University to develop a 2+2 program for Biotechnology and Environmental Health, to develop a program where ESF students could do semesters abroad at Mahidol.

Develop closer collaborations with Syracuse University and the Medical School to develop the Environmental Health/Environmental Medicine programs, and work to make it a major research effort in Syracuse.

Continue working with Clear Path for Vets, and develop internship opportunities for students in EFB.

Travel to Tyumen University in Siberia and develop a collaborative program that will bring faculty, graduate students and undergraduate students to ESF to engage in joint research programs. Also, work with University officials to develop exchange student and joint degree programs in Environmental Biology and Environmental Science.

Work the colleagues to develop relationship with Burapha University of Thailand to develop exchange student and joint degree programs in Environmental Health

Work the colleagues to develop relationship with Hanoi University of Vietnam to develop exchange student and joint research programs in Phytoremediation and Aquatic Science

Work with group in China to develop a new International Center for Excellence at Zhejiang University in Hangzhou, China, and supported by the Chinese Academy of Science, focusing on integrated contaminated land management and remediation.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2014

a. Course(s) to be offered

None at this time.

b. Proposed research activity

Write more grant proposals!

Write more papers!

Research activities include the continuation of research projects already underway by graduate and undergraduate students in the laboratory. These include the verification of a hyperspectral imaging system to determine exposure of plants to the groundwater contaminant trichloroethylene to determine its applicability for multiple genera of plants. Previous work has shown that this will be possible, but we now need to refine and confirm the initial findings. We are expanding our scope of studies to look at native and naturalized plants that would be found on impacted sites, and compare that to our poplar data. We are also working to understand the nature of the signal at a molecular level by analyzing proteins isolated by the 2-D gel system we perfected over the past year. This work is being done by a graduate student and an undergraduate student. We are also expanding this program to work with EPA to develop the sensor to detect heavy metal contamination, and also working with the International Space Station team to develop a system that can monitor plant health for long-term space missions, such as to Mars. We are currently working on development of a hand held sensor to move the technology into the field. Following receipt of the patent for the technology, NASA is actively working with commercial partners to license the patent.

Although TCE phytoremediation is well understood in terrestrial systems, the mechanism of action of TCE remediation in wetlands is still a 'black box.' 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.

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. This project will is through a McIntyre Stennis award, and a graduate student will be added to this project. 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 a graduate student. We have implemented a field study, and will be monitoring this for the coming growing season.

We received funding this year from FMC Corporation to look at how endophytes increase or impact crop plant disease resistance following various methods of application of endophytes to the plants. This work supported the post-doc in the lab. We are currently writing up the results of this work.

A student from Thailand will be arriving in the lab this fall to look at the interactions between endophytes and lead contamination; the impact of the endophytes on plant uptake and potential toxicity reductions.

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 a graduate student who was assisted by a visiting Post-doc from Thailand during summer 2015. We submitted an NSF grant in February for this project which had very strong reviews, and we will be resubmitting this year.

We finished the project looking at the impact of safeners, supposedly inert compounds in pesticide formulations, on toxicity resistance and metal uptake in plants. We looked 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 was done by a graduate and an undergraduate student, and we are writing this paper now.

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. This work has been done in the past by three undergraduate students, two of whom graduated. This past year, a Ph.D. student, co-Advised with Don Leopold, has taken on this project.

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
- Transporters
- Toxicity response
- Metabolic response

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

How different type nanoparticles (copper, zinc, platinum, gold, etc.) impact crop plants

The metabolic changes in plants following nanoparticle exposure

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

Understanding how mycorrhizal organisms will impact both uptake and accumulation of nanomaterials in the soil. This work is being done by the post doc who was originally the visiting PhD student from Iran.

Understanding the accumulation patterns for nanomaterials in insects following ingestion of nanomaterials exposed plants.
We are also in the process of writing a paper on the plant screening results.

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 been indoor recreational and therapeutic activities to increase patient interactions through the use of plants. We are also working and will continue to work with Clear Path for Vets to develop these programs for a wider audience.
We have developed a Horticultural Therapy program at Brookdale, and Alzheimer care facility in Fayetteville, and have a graduate student and four undergraduate pre-health students working in that program.

We will also continue to get preliminary data to resubmit grant proposals to develop a program in phytopharmaceutical production using nuclear encoded plastid transporters. We have received seed funding to get preliminary data, which will make us more competitive for larger grants.

We will have a graduate student from Siberia visiting this academic year, who will be developing a project on petroleum based phytoremediation that can be used to address problems contamination problems in Siberia.

We will also develop a collaborative project with researchers at the Wadsworth Center in Albany to determine the roles of plants and microbes in bioswales for treatment of pharmaceutical chemicals released from large-scale confined animal feeding operations.

c. University, professional society, and public service

Continue with services as described:

Membership and Service to the International Phytotechnology Society
Planning the 13th International Phytotechnology Society meeting in Hangzhou, China
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, in collaboration with colleagues from Upstate Medical University.
Continue to attend and participate in the open houses and receptions for new incoming freshman and transfer students
Serve as Chair of the Organizing Committee for the 2017 Biotech Conference to be held in Syracuse.

Additionally, I will continue 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 MPS, MS and PhD degrees in Environmental Health
Work with colleagues at ESF, UMU, 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, the Research Foundation and Brookhaven National Laboratory to develop research and training opportunities that benefit both SUNY and BNL.

Continue as Coordinator for both the Health and the Environment Option and the Environmental Health major.

Continue to serve as the Pre Health Advisor for Environmental Biology

Develop the international course with faculty at the University of Parma

Develop promotional materials for the Environmental Health Major, for students, administrators and potential donors

2. Fall Semester 2015

a. Course(s) to be offered

BTC401/EFB601 Molecular Biology Techniques
BTC/EFB/EHS 420 Internship in Biotechnology
BTC/EFB298 Research Apprenticeship
BTC/EFB/ENS498 Undergraduate Research
EFB495 Undergrad Exp/ College Teaching
EFB496/796 Plant Physiology Recitation
EFB899 Masters Thesis Research
EFB999 Doctoral Thesis Research
ENS132 Orientation Seminar in Environmental Science/Health

b. Proposed research activity

See above

c. University, Professional society, and public service

See above, with the following:

Invite collaborators from Siberia to visit ESF and continue discussions on collaborative research and degree programs

Visit China to meet with colleagues to continue conversations about Center of Excellence

3. Spring Semester 2016

a. Course(s) to be offered

EFB325 Cell Biology
EFB496/796 Cell Biology Recitation
EFB438/638 Phytoremediation
BTC499 Senior Synthesis
EFB202 Diversity of Life (co-teach)
BTC/EFB/EHS 420 Internship in Biotechnology
BTC/EFB298 Research Apprenticeship
BTC/EFB/ENS 498 Undergraduate Research
EFB495 Undergrad Exp/ College Teaching
EFB899 Masters Thesis Research
EFB999 Doctoral Thesis Research
EHS494 Environmental Health Capstone

b. Proposed research activity
See above

c. University, professional society, and public service
See above