

ANNUAL REPORT: June 1, 2016 – May 31, 2017
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	23	2
	EFB 601	Molecular Techniques	4	3	1
	ENS 132	Environmental Health Orientation	1	14	0
SPRING:	EFB 325	Cell Biology	3	83	0
	BTC 499	Senior Synthesis	1	21	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:	BTC 298	Research Apprenticeship		2
	BTC 420	Internship in Biotechnology		5
	BTC 496	Molecular Techniques Lecture		1
	BTC 498	Research Problems in Biotechnology		4
	EFB 430	Prof Internship in Environmental Biology		2
	EFB 495	Undergrad Exp/ College Teaching		3
	EFB496/796	Plant Physiology Recitation		2
	EFB 498	Research Problems in Env. For. Bio.		2
	EFB 798	Research Problems in Envir. and For. Bio.		2
	EFB 899	Master's Thesis Research		2
	EFB 999	Doctoral Thesis Research		3
	EHS 420	Internship in Environmental Health		4
	ENS 498	Research Problems in Environmental Science		6
SPRING:	BTC 298	Research Apprenticeship		2
	BTC 420	Internship in Biotechnology		4
	BTC 498	Research Problems in Biotechnology		5
	EFB 420	Internship in Envir. For. Bio		1
	EFB 495	Undergrad Exp/ College Teaching		7
	EFB 496/796	Phytoremediation		28
	EFB 496	Study Abroad		1
	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		4

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

Planning for Biotechnology in the Classroom workshop for high school and middle school teachers to be done summer 2017

4. Guest Lecture Activities

Course No.	Title	No. of Lectures
BTC 132	Orientation Seminar	1
EFB 132	Orientation Seminar	1

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor 89 and unofficial advisor _____
Over the course of the past year I have had 31 undergraduate students (23 of whom I am academic advisors to) who are conducting research in my laboratory or internships under my supervision:

Kensley Portman	Molly Devlin	Nicole Leonard
Jonathon Peralta	Kai Troge	Kiera Hyacinthe
Julia Bernhardt	Emily Taff	Billie Li
Jordan C'Dealva Lenik	Thomas Bronk	Keenan Porter
Haley Sussman	Kyna Sanchez	Nadia Abuqube
Sonia Mensah	Nick Bentley	Ashley Adler
Christina Collins	Alexander Goldsmith	Madison Aldrich
Eric Schiavone	James Capanegro	David Voytovich
Christopher Schiavone	Anuli Onwumelu	Alex Kirschner
Jacob Choi	Baylee Woods	Caleigh Quick
Alexandra Cook		

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/MPH	August 2012	
Ashley Pirovano	PhD/MS/MPH	August 2014	
Gabrielle Fanfan	MS	January 2013	
Charlotti Atti	MS/MPS	August 2014	Spring 2017

CO-MAJOR PROFESSOR

Co-Advising with Ted Endreny			
Scott Wolcott	PhD	August 2012	
Co-Advising with Donald Leopold			
Jessica Saville	PhD/MPH	August 2013	December 2016

VISTING STUDENTS

Nikolai Invanov	Tyumen State University, Siberia, Russia
Jiraporn Yongpisanphop	Thammasat University, Thailand

MEMBER, STEERING COMMITTEE (other than those listed above)

GRADUATED

None at this time

CURRENT

Jiangeng Wen	Vernon Coffey
Tian Xu	Thomas Frontera
Joshua Harris	Brandon Haynes
Joseph Shoytush	Ryan Scheel
Youl Han	

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

Reem Alawadhi	Chair, PhD Candidacy Exam Committee
Adam Scalisi	Chair, Thesis Defense

***C. Post Graduates

POST DOCTORAL FELLOW

Azam Nori	Tarbiat Modares University	Iran
-----------	----------------------------	------

VISITING SCHOLAR

None at this time

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 of 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 2017; 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 Dec 2017; current year \$32,268; L Newman; PhD. student Adam Hoffman supported.

Ministry of Education and Science of the Russian Federation; Fellowship Exchange Student Support; \$23,800; October 2016 to May 2017; L. Newman; Visiting PhD student Nikolai Ivanov supported

Multiple Sponsors; New York State Biotechnology Symposium, \$18,807.00; Dec 2016 to November 2017; Katherina Searing, L. Newman, A. Stiponovich, T. Amadon.

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 2017; 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 June 2017; L. Newman.

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).*

Center of Excellence Grant; Measuring the impact of houseplants on improving indoor air quality in a classroom setting; \$25,000

Exon Mobile/Roux Associates; Determination of Utility of Plants and Treatment Wetlands for PFOA Remediation; \$35,003

3. *Research Proposals submitted, but rejected (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.

National Science Foundation; Understanding and Using the Genetic Mechanism for Phytoremediation of Chlorinated Solvents Environmental and Societal Impacts; \$381,652; L. Newman and E. Folta

IV. PUBLICATIONS

A. Refereed Publications

1. Noori, A, S. Taghavi, D. van der Lelie, L.A. Newman. 2017. Elucidating Mechanisms of Biopesticide Induced Plant Pathogen Resistance for *Bacillus* Species. *Advances in Environmental Biology*. Accepted.
2. Noori, A., J.C. White, L.A. Newman. 2017. Mycorrhizal fungi influence on silver uptake and membrane protein gene expression following silver nanoparticle exposure. *Journal of Nanoparticle Research*. *Nanopart Res* (2017) 19: 66. doi:10.1007/s11051-016-3650-4.

B. Non-refereed Publications

None at this time

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

The Effects of Herbicide Safeners on Nickel Uptake and Toxicity in Maize. L.A. Newman and F. Afelumo. 22-26 September 2016. 5th International Conference on Soil Pollution and Remediation, September 2016 in **Hangzhou, China**

The Gordon Award. 27-30 Sept 2015. 26-29 September 2016. 13th International Phytotechnology Conference, **Hangzhou, China**.

Phytoremediation of Organics: State of the Science. L.A. Newman. 26-29 September 2016. 13th International

Phytotechnology Conference, **Hangzhou, China**.

Hyperspectral Investigation of Trichloroethylene in Groundwater. A. Keith, D. Lewis, A. *Hoffman* and L.A. Newman. 20-24 November, 2016. 3rd International Conference on Contaminated Land, Ecological Assessment and Remediation, **Taipei, Taiwan**.

Physiologic & genetic impacts of exposure to *Enterobacter* 638 in tomato plants. L.A. Newman and G. *Fanfan*. 18-19 May 2017. 9th Annual New York State Biotechnology Symposium, Syracuse, NY.

Seminars Presented

Phytotechnologies at SUNY ESF. Lake Bilal, Tyumen State University, **Russia** 26 June 2016

Phytoremediation: Using Plants to Solve Environmental Problems. Tyumen State University, **Russia** 12 March 2017

Use of Molecular Techniques in Phytoremediation. Tyumen State University, **Russia** 13 March 2017

Environmental Biology, Biochemistry and Biotechnology at the College of Environmental Science and Forestry. Tyumen State University, **Russia** 14 March 2017

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

Oral Presentation:

None at this time

Poster Presentations:

Engineered Nanomaterials and Agricultural Crops: Co-contaminant Interactions. R. De La Torre-Roche, I. Pagagano, S. Majumdar, H. Hamdi, J. Hawthorn, Y.Q. Deng, B.S. Xing, *W.J. Cai*, **L.A. Newman**, Q. Wang, X.M. Ma and J.C. White. 26-29 September 2016. 13th International Phytotechnology Conference, **Hangzhou, China**.

A Screening Study: Phytotoxicity of Uncoated Metal Nanoparticles to Crop Plants Compared to Their Corresponding Bulk Particles and Salts. *W.J. Cai*, J. White, B.S. Zing, X.M. Ma, B. Agtuca, and **L.A. Newman**. 26-29 September 2016. 13th International Phytotechnology Conference, **Hangzhou, China**.

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

None at this Time

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

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 held in Amherst, MA, October, 2016 and to be held in October 2017

International Organizing Committee – 5th International Conference on Soil Pollution and Remediation, September 2016 in Hangzhou, China.

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 Hangzhou, China, 2016; Member Scientific Advisory Board for Annual Conference to be held in Montreal, September 2017.

Chair of Organizing Committee for Biotechnology Research Symposium held in May 2017 in Syracuse, NY and to be held in May 2018.

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)

International Journal of Phytoremediation

Responsibility

Editor-in-Chief

Other (books, symposia, etc.)

Phytoremediation: Management of Environmental Contaminants vols. III, IV and V

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)

Ecological Engineering

No. of manuscripts

2

PLOS ONE

1

Chemosphere

1

Journal of Agriculture and Food Chemistry

1

Environmental Science and Technology

1

Science of the Total Environment

4

FEMS Microbiology Letters

1

Journal of Hazardous Materials	1	
Sustainability	1	
Earth Sciences	1	
<u>Agency</u>	<u>No. of proposals</u>	
ESF Research Committee McIntyre Stennis	4	
c. Participation (workshops, symposia, etc.)		
<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
2017 Biotechnology Symposium Symposium Session Chair	18-19 May 2017	Syracuse, NY

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.
None at this time

D. Foreign Travel (Where, When, Purpose)

Tyumen, Siberia, Russia. 17-28 July 2016. To develop international research and education opportunities with students and faculty at Tyumen State University.

Hangzhou, China. 24-27 September, 2016. Present at 5th International Conference on Soil Pollution and Remediation

Taipei, Taiwan. 20-24 November, 2016. Present at 3rd International Conference on Contaminated Land, Ecological Assessment and Remediation

Tyumen, Siberia, Russia. 12-18 March 2017. To develop international research and education opportunities, and dual diploma programs with students and faculty at Tyumen State University.

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
- 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
- Chair, Committee on Research
- Member, Academic Governance Executive Committee
- 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
- Development of ESF/Brookhaven National Lab Research and Education Collaborations
- Development of Research Collaboration program between ESF and Tyumen State University, Russia
- Development of joint MS and PhD degree programs between ESF and Tyumen State University, Russia

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 for the second time this year, and it continues to be 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 carnivorous plants, and area where I do not have any expertise, so it was a learning experience for me as well. I also continue to co-teach Biodiversity II, with the topic area of Prokaryotes. 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 31 undergraduate students in the lab, 4 PhD, 2 MS students, and two visiting PhD students, one from Tyumen State University, Siberia and one from Thammasat University, Thailand; and one post-doctoral fellow from Iran. 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. 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 \$1700 of food to a local food pantry and over \$500 to support a local pet food pantry. I have always encouraged students to attend local and national conferences to gain experience and also to develop a network of contacts for future careers. This year, I expanded this to include students from the Environmental Health major, as well as academic advisees who work at the Medical School. I hope to be able to generate funds to be able to take any of the Environmental Health students who wish to attend to the Association for Environmental Health Science annual conference in October, held in Amherst MA. I am also encouraging international students who will be in the lab starting in the fall to attend the International Phytotechnology Society Conference in Montreal, Canada, as both of these conferences can be reached by car or van. Finally, I continue to work with other

facilities and entities around Syracuse, to develop both internship and research opportunities for students outside the ESF campus to expand their thoughts and options.

Department/College/SUNY

I am continuing my work on the departmental Course and Curriculum Assessment Committee and the Tenure and Promotion Committee, and I am now chair of 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, one additional graduate student and seven 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 and developed a kitchen garden for their Wednesday Canteen program. I am also designing a natural playground for the site to be used on Saturday Warrior Reset and Family Programs. I was a member of the Chemistry department search committee for the new faculty hire in Environmental Health/Environmental Chemistry. For the 6th 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 three speakers give seminars that were open to the college and the public, Ms. Amanda Ludlow of Roux Associates, Dr. Joel Burken from Missouri Science and Technology, and Mr. Tim Carey from the Army Cold Regions Research and Engineering Laboratory. I am still working with the administration at Brookhaven National Laboratory to develop and forward the major goals of an MOU, which would result in ESF and BNL having closer research ties, including joint management of an ecological preserve. To this end, I brought Dr. Chris Nomura, Dr. Quentin Wheeler, and Susan Sanford to BNL for their Open Stewardship day to tour the site and see the type of work going on there. I have also been working with faculty and staff at ESF to develop a series of courses, to be taught at BNL, which would benefit high school teachers and allow them to earn ESF credits. I have been working with Scott. 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. We should have our first students coming to ESF in fall 2018, although a few might start this fall. 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 health 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 was also the ESF advisor for students wishing to participate in the UMU 3+3 program to earn a Doctor of Physical Therapy degree; however, this program will not be continued after this year. 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 the search committee for a new hire in Chemistry, to teach in the Environmental Health program (Environmental Sampling). This year, I also took the lead on the submission of the accreditation package to the National Environmental Health Science & Protection Accreditation Council to seek accreditation for the Environmental Health major. This included doing a self study of the program, and completing a course comparison grid to ensure that we are teaching all required material for accreditation. In April, the college hosted the site visitation team, and I met with them for three days to go over the courses, the support and goals of the program. Following their visit, the submitted an evaluation of the program, and I submitted a response to their concerns about the program. This summer, I will be attending the Council's annual meeting where the program will be reviewed and accreditation voted on. I continue to oversee the management and use of \$650,000 of equipment for the Environmental Health/Environmental Medicine Biotechnology center, for use by ESF, Upstate Medical University and

the Biotechnology Accelerator personnel. And finally, for the past year, I have lead the efforts to develop research and education collaborations with Tyumen State University in Siberia, including taking part in a 10-day visit to Tyumen, which included visiting multiple research laboratories, technical facilities, two field stations and several cultural site. This visit included Dr. Don Leopold (Chair, EFB), Dr. Russ Briggs (Director, Environmental Science) and Dr. Guy Lanza, Adjunct Professor in ESF. In October and November, I hosted two groups of visitors from TSU, including Dr. Andrei Tolstikov, Vice Rector of Research and several department heads and research team leaders. We visited both the Thousand Island Biological Station, the Adirondacks Ecological Center, as well as cultural and natural sites in New York state. In March, I returned in Tyumen to continue discussions on the development of both a joint MS diploma in Biotechnology, and joint PhD diploma programs in Biology, tick-borne diseases, and environmental chemistry. We have started negotiations on the joint diploma programs, and will have the first student for the program starting in Fall 2017.

Self:

I continue as Editor in Chief for the International Phytoremediation Journal after the untimely passing of the co-Editor, Stephen Ebbs. The journal 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. Unfortunately, our annual impact factor dropped slightly this year due to increase numbers of published papers, but continues to 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 Hangzhou, China, in September 2016. 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. 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; and have completed volumes 4 and 5 and are in discussions with the publishers for a 6th volume. The volumes continue to be heavily cited and very well received.

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 the EFB 496/796 Cell Biology Recitation 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. I want to expand 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. I also 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. This year I plan to include the Children's hospital in the 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 also plan to start a new course, EHS 332, which will work with students to improve their writing and presentation skills prior to the start of their internships, with emphasis on cover letters and resumes for application for internships.

Also with Environmental Health, I will be traveling to Grand Rapids, Michigan this summer for the final presentation of the program for accreditation approval. I am hopeful that we will achieve some level of accreditation (Pre- or Conditional) if not Full Accreditation.

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

Continue working to 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, as well as work with our Research Programs on the hiring of a Center Director.

Continue working with Clear Path for Vets, and develop internship opportunities for students in EFB. I also hope to finalize the design for a natural playground for their family days programs.

Continue the Therapeutic Horticulture program at Brookdale Assisted Living center to give students the opportunity to work with patients with dementia and Alzheimer's Disease.

Continue discussions with faculty and administration at Tyumen University in Siberia to 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. This will entail additional visits to Tyumen, as well as continuing to host visits to ESF from faculty, students and administration.

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

Continue discussions with the group in China on the development a the 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 2017

- 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 confirming the accuracy 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. We are also pursuing collaborations that would expand the studies to look at additional compounds, included a proposed project with the Danish government to look at pesticides in drinking water.

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 project is funded through a McIntyre Stennis award. 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. This student has defended her MS thesis, and we are writing up the results for publication. We are also looking at additional plants, including those that might be used for site restoration, to see if inoculation might give them a better chance for survival under adverse conditions.

We received funding last 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. The manuscript describing this work has been conditionally accepted, and we are working on revisions.

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. 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 hoping to look 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.

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

We are also in the process of writing a paper on the plant screening results.

Continue to work 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. We are also working and will continue to work with Clear Path for Vets to develop these programs for a wider audience.

Continue to manage the 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.

Develop a similar program at Children's Hospital, to enable ESF student and childhood patients to work together in a garden setting.

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 coming back for his joint PhD diploma program, who will be developing a project 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 to treat pharmaceutical chemicals released from wastewater treatment operations.

c. University, professional society, and public service

Continue with services as described:

Membership and Service to the International Phytotechnology Society

Planning the 14th International Phytotechnology Society meeting in Montreal, Canada

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 2018 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 UMU to develop a true collaborative MD/PhD 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

Development of international courses with faculty at Tyumen State University

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

2. Fall Semester 2017

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:

Continue discussions with faculty and administrators from Tyumen State University in Siberia collaborative research and degree programs
Visit South Korea to explore potential for joint diploma programs and collaborative research between ESF and University of Science and Technology in Daejeon, South Korea
Continue meetings with colleagues in China about development of Center of Excellence in Environmental Research

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