

ANNUAL REPORT: June 1, 2009 – May 31, 2010
(i.e., Summer 2009, AY 2009-2010)
DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY
SUNY-ESF

NAME: James P. Nakas

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:	EFB 899	M.S. theses research	1	1	
	EFB 999	PhD thesis research	1	1	
FALL:	EFB 301	Latin for Scientists	1	65	-
	EFB 303	Microbiology	4	52	2
SPRING:	EFB 505	Microbial Ecology	2	17	-
	EFB 403	Microbiol. Dis. Fish & Wlf	1	18	-
	EFB 796	Microbiol. Dis. Fish & Wlf.	1	2	-

NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT. For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning. EFB courses currently listed with service-learning components include: 416/6/1, 486, 518, 521, 532, 446/646.

None of my courses have a service-learning component where students are actively engaged with the community. Apparently this is a new item in the annual report and, according to the Provost, is for data gathering purposes only and has no evaluative function.

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>
SUMMER:	EFB 899	M.S. theses research	1	1
	EFB 999	PhD thesis research	1	1
FALL	EFB 420	Internship/EFB	4	1
	BTC 498	Res.Prob/Biotechnol.	3	1
	EFB 899	M.S.Thesis Research	8	2
	EFB 999	PhD Thesis Research	8	3
SPRING:	EFB 498	ResProb/ EFB	4	3
	BTC 498	ResProb/Biotechnology	6	2
	EFB 899	M.S. thesis research	9	2
	EFB 999	PhD thesis Research	11	3

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

None

4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
BTC ???	Seminar on biodegradable polymers for students in the Biotechnology Major	1

II. STUDENT ADVISING

A. Number of undergraduates for whom you are the student's official advisor _12_ and unofficial advisor _None_

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

MAJOR PROFESSOR

- 1) Mr. Chengjun Zhu, PhD, January, 2007
- 2) Mr. Wenyang Pan, PhD, January, 2008
- 3) Mr. Christopher Addona, M.S., Sept., 2007
- 4) Ms. Rosanna Stoutenburg, M.S. Sept., 2008, switched to PhD January, 2010

CO-MAJOR PROFESSOR

MEMBER, STEERING COMMITTEE (other than those listed above)

CHAIRMAN OR READER ON THESIS EXAMS, ETC.

- 1) Laurent Randrianarisoa Bernard—recently appointed
- 2) Yue Zuo, defended 12/1/2009—Chairperson of defense

III. RESEARCH COMPLETED OR UNDERWAY

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

- 1) Conversion of Wood Hydrolysates to Ethanol using *Pichia stipitis*—5%
- 2) “ “ “ “ “ *Zymomonas mobilis*—5%

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

- 1) Antek Incorporated, hydrogen research, J. Nakas and A. Terrinoni; \$29,064; July 2006 to June 30, 2010
- 2) NYSERDA, Production of value-added biodegradable plastics from NYS's low-value biodiesel process-glycerin; C. Nomura and J. Nakas; 79,983; July 2007 to July 2010.
- 3) US DOE, Hot water extraction of hardwood chips and utilization of the residual chips and wood; T. Amidon, J. Nakas and S. Liu; \$1,488,000; October 2007 to September 2011.
- 4) Hillard Corporation, The use of microporous ceramic composite membrane technology in the improvement of biofuels and bioproducts; J. Nakas and J. Fieschko; \$190,000; July 2007 to May 31, 2010
- 5) Blue Highway LCC, Biodegradable plastics from renewable sources for manufacturing medical products in CNY; J.P. Nakas, D. Danna, A. DiRienzo, J. Fieschko, and C. Nomura; \$350,000; October 2008 to December 2011.

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

None

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

None

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) Zhu, C., C.T. Nomura, J.A. Perrotta, A.J. Stipanovic, and J.P. Nakas. 2010. Production and characterization of poly-3-hydroxybutyrate from biodiesel-glycerol by *Burkholderia cepacia* ATCC 17759. *Biotechnol. Prog.* 26: 424-430.
- 2) Pan, Wenyang, D.J. Kiemle, A.J. Stipanovic, T.E. Amidon, S. Liu, and J.P. Nakas. 2010. Production of poly-β-hydroxyalkanoates by *Burkholderia cepacia* ATCC 17759 using detoxified sugar maple hemicellulosic hydrolysate. *Biotechnol. Lett.*, submitted.

B. Non-refereed Publications

None

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

- 1) Zhu, C., C.T. Nomura, J.A. Perrotta, A.J. Stipanovic, and J.P. Nakas. 2010. Production and characterization of poly-3-hydroxybutyrate derived from biodiesel-glycerol by *Burkholderia cepacia* ATCC 17759. *Amer. Soc. Microbiol.*, National Meeting, May 23-27, 2010.

Mr. Zhu was awarded a travel grant (\$500) by the Amer. Soc. Microbiol. to attend the national meeting in San Diego, CA. The award was based on the quality of a submitted abstract. Mr. Zhu was also awarded a travel grant (\$400) by the Office of Instruction and Graduate Studies at ESF to attend the ASM meeting.

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

None

V. PUBLIC SERVICE

A. Funded Service (include consulting activities)

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

None

2. Industrial and Commercial Groups, etc.

Institutional Biosafety Committee, Bristol Myers-Squib Inc., Syracuse, New York

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

None

VI. PROFESSIONAL DEVELOPMENT

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

None

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

None

3. Professional Society Membership

- a) American Society for Microbiology
- b) American Academy of Microbiology

3. Other Professional Activities

- a. Editorial activity

Journal (s)
Responsibility

Other (books, symposia, etc.)

b. Reviewer

<u>Journal(s)</u>	<u>No. of manuscripts</u>
1) Appl. Biochemistry and Biotechnology	1
2) BioResources	1

<u>Agency</u>	<u>No. of proposals</u>
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Other

c. Participation (workshops, symposia, etc.)

<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
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C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

None

D. Foreign Travel (Where, When, Purpose)

None

VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

B. College-level

- 1) Director, SUNY Center for Applied Microbiology
- 2) Member, Radiation Safety Committee
- 3) Chairperson, Institutional Biosafety Committee (ESF)

C. University-wide, including Research Foundation

- 1) Director, SUNY Center for Applied Microbiology
- 2) Advisory Committee, Biotechnology Research Center.

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 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, which I'll continue to award based on your contributions to the department and college this reporting period.

- A.) Regarding our undergraduate students, during the past year I have made my laboratory more accessible for students who wish to explore research possibilities in microbiology. To this end, I have had up to three students in the laboratory during each semester. The undergraduate student is assigned to a graduate student to assist in experimental design, data collection, visualization of data in graphic or tabular form, interpretation of data, etc., etc. I meet with each student pair at the beginning of the semester and periodically during the semester to outline their duties and monitor their progress. This approach to involving undergraduates in laboratory research has worked very well and the students have all had favorable comments on their experience.
- B.) My contributions to the department/college will be taken from my research as I see more contributions there than in other areas:
- 1) Collaborations continue with Welch Allyn, Tessy Plastics, and Blue Highway for the purpose of producing sufficient quantities of biodegradable polymers for use in medical products via injection molding. To date, fermentation for polymer production has been scaled-up to 200L using biodiesel-glycerol as the carbon source. A trial run for the production of ear tips using our polymer was conducted at Tessy Plastics and sample tips were produced.
 - 2) Several meetings were held with a relatively new company, Auburn Biodiesel, for the purpose of securing a reliable source for biodiesel-glycerol. The CEO of Auburn-biodiesel agreed to supply us with glycerol for all of our fermentation needs.
 - 3) Because of our focus on producing biodegradable plastics from biodiesel-glycerol, we have filed a new technology disclosure (NTD) to the Research Foundation prior to submitting a new patent application on this process. The CEO of Auburn Biodiesel has offered to pay for the patent application to the USP&TO.
 - 4) Recently, we have concentrated our efforts on polymerizing our PHAs (polyhydroxyalkanoates) in a manner that, if successful, will generate polymers of enormous size, perhaps 1 to 2 million Daltons, with unpredictable physical-chemical properties. Discussions with the Technology Transfer Office of the RF indicate their willingness to pursue this as a separate patent or perhaps combined as an extension of the patent described in 3). This would be a separate patent application from the US and Canadian patents which are still pending and separate from that described in 3).
 - 5) After almost five years and many hours of meetings as part of the advisory committee for the CNY Biotechnology Research Center, it is now very gratifying to watch the steel being raised for the CNYBRC in close proximity to the Center of Excellence. The Biotechnology Research Center will serve as a focus for research by new and emerging companies in central New York and provide space

for collaborative efforts with academic institutions to stimulate economic development.

- 6) My research group will soon initiate experiments, in collaboration with Drs. Driscoll and Stipanovic to test wood hydrolysate, generated using an electron beam, to separate lignin from cellulose and hemicellulose, as a source of sugars for fermentation purposes. The fermentations will be directed toward the production of ethanol, butanol, and PHAs.

C.) Reflecting on what I have done for myself, I can state that I have devoted a considerable amount of time with corporate entities (Welch Allyn, Tessy Plastics, Blue Highway, Auburn Biodiesel, Northern Biodiesel, Sunoco, R₃Biofuels, etc., etc.) trying to understand what they want from the academic community and trying to deliver it. They do not necessarily want, or need, to know about our latest publication as much as they need to know how what we have learned can make a better product or improve a process to make the product better, more efficiently, or greener. The latter has considerable appeal and fits well with our work on biodegradable plastics.

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)

My future plans will focus on continuing with, and expanding, the relationships I have initiated with corporate partners regarding our work with biodegradable polymers, specifically, PHAs. I believe this is an area of research and collaboration to which we are well suited and to which ESF, through our Polymer Chemistry group, can make significant contributions. The knowledge base already exists within ESF and need only be nurtured and expanded as the demand for greener products begins to dominate the market.

As already mentioned, I have a personal interest in polymerization of our PHAs as this has not been previously reported in the literature and the effect(s) on the physical-chemical properties are unknown and largely unpredictable. I will be collaborating with Blue Highway and members of our Polymer Chemistry group on these experiments.

B. PROJECTED ACTIVITIES FOR NEXT YEAR

1. Summer 2009

a. Course(s) to be offered

No formal courses will be taught during the summer but I will have one undergraduate student doing her internship as part of her Biotechnology major requirement(s).

b. Proposed research activity

As described above

c. University, professional society, and public service

- 1) Institutional Biosafety Committee—Bristol Myers-Squibb
- 2) Radiation Safety Committee—ESF
- 3) Institutional Biosafety Committee—ESF

2. Fall Semester 2010

a. Course(s) to be offered

- 1) Microbiology (with Castello)—4Cr.
- 2) Latin for Scientists—1Cr

b. Proposed research activity

As described above

c. University, Professional society, and public service

- 1) Institutional Biosafety Committee—Bristol Myers-Squibb
- 2) Radiation Safety Committee—ESF
- 3) Institutional Biosafety Committee—ESF

3. Spring Semester 2010

a. Course(s) to be offered

- 1) Microbial Ecology—2Cr.
- 2) Microbiol. Dis. of Fish & Wldlf.—1Cr.

b. Proposed research activity

As described above

b. University, professional society, and public service

- 1) Institutional Biosafety Committee—Bristol Myers-Squibb
- 2) Radiation Safety Committee—ESF
- 3) Institutional Biosafety Committee—ESF