

REQUIRED COVER PAGE

APPLICATION FOR FACULTY RESEARCH GRANT

****All questions must be completed to be considered for grant award.**

Choose one: <input type="checkbox"/> Creative <input checked="" type="checkbox"/> Research	Date of Last FRG Award (Semester and Year awarded): <u>None</u> (several past "minigrant") Date of ATU Faculty Appointment (Semester and Year): <u>Fall, 1981</u>
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1. Project Title: Isolation of Antibiotic-Enhancing Microbes
2. Name of Principal Investigator/Project Director: Dr. Scott Kirkconnell, Professor of Biology
3. School (abbrev): PLS 4. Department: Biology
5. Campus Mail Address: 1701 N. Boulder 6. PI/PD Campus Phone: 479-968-0675
7. Amount Requested: \$ 2,000 8. Total Cost of Project: \$ 2,400
9. Does this project involve: 10. Duration of Project: Continuing
- Yes No**
- ☐ ☒ human subjects?
- ☐ ☒ animals/animal care facility?
- ☐ ☒ radioactive materials?
- ☐ ☒ hazardous materials?
- ☐ ☒ biological agents or toxins restricted by the USA Patriot Act?
- ☒ ☐ copyright or patent potential?
- ☐ ☒ utilization of space **not** currently available to the PI/PD?
- ☐ ☒ the purchase of equipment/instrumentation/software currently **available** to the PI/PD?

NOTE: If the answer is "yes" to any of the above questions, the investigator must attach appropriate documentation of approval or justification for use/purchase.

SIGNATURES

Department Contribution (if applicable): \$ 200

Account Number: PSB105 262000

Charlie Fagan 10-16-06
Chairperson Date

School Contribution (if applicable): \$ 200

Account Number: 266000 (or 261000)

Bob Bloom 10-16-06
Dean Date

This Section to be completed by the Office of Academic Affairs

FSBA Committee Award Recommendation: Yes No
FSBA Committee Proposal Rank: of Total Proposals.
Recommendation of VPAA: Yes No
Recommendation of President: Yes No
Award Date:

B. Abstract

Identification of microbes that enhance the effectiveness of the antibiotic, streptomycin by testing soil organisms for ability to inhibit streptomycin-resistant *Pseudomonas fluorescens* in the presence but not the absence of streptomycin is proposed.

C. Purpose/ Objectives

In this laboratory, we have search for such antibiotic potentiating bacteria, and have obtained very promising results. Unfortunately, the most promising strains of antibiotic-potentiating microbes seem to have lost their productive capacities after being maintained on laboratory media for several months. The following approaches are planned to preserve the antibiotic-potentiating capacities of promising strains:

1. Immediate refrigeration and freezing of such cultures
2. Rapid growth and recovery through filter sterilization of broth from cultures so that the enhancing molecules can be recovered, preserved, and evaluated.
3. Very frequent monitoring of lab cultures to determine whether they are losing their antibiotic-enhancing capabilities.

This research project is unending in potential for expansion. Future questions involving antibiotic-enhancing microbes include isolation and characterization of the molecules involved in antibiotic potentiation, determination of the species involved in antibiotic potentiation, and evaluation of modes of action of the molecules involved

D. Significance/ Need

Soon after the first discoveries of antibiotics, the problem of antibiotic resistance became evident. In the early years of research, the scope of this problem was not appreciated, because there seemed to be an inexhaustible source of new antibiotics produced by soil microorganisms. Exhaustive screening of soil samples was accomplished in the early 1950s, and successes at finding new antibiotics have been very few and far between since the 1960s. The revolution in computer sciences has opened new vistas for the rational design of antibiotics, but there is no assurance that this approach will be adequate to deal with the abilities of bacteria to use mutation and recombinational mechanisms that enable them to resist even these antibiotics. A multitude of approaches needs to be used in the search for ways to deal with this worldwide threat to human health. The approach envisioned here is original, and has not been attempted in other labs.

E. Process for attainment of objectives/ Goals

A start has already been made on artificial selection of streptomycin-resistant strains of *Pseudomonas fluorescens* (which is not a human pathogen). A background of this organism will be mixed with soil, spread onto Petri dishes, and soil microbes that produce

zones of inhibition in the presence of streptomycin, but not in its absence, will be good candidates for streptomycin-enhancing isolates. Work with naturally occurring antibiotic resistant bacteria obtained from hospitals may seem attractive, but such work is too dangerous to pursue at Arkansas Tech University at the present time. Isolating bacteria that are able to increase the effectiveness of streptomycin, is the purpose of this research project, and this goal should be achievable by the 4 undergraduates working on this project by next summer. Standard incubators and traditional approaches to microbiological research will be used. High-tech instrumentation necessary for molecular biological approaches is not available at ATU, but such equipment will not be necessary for the contemplated research.

F. Dissemination of results

Results will be reported at the annual meetings of the Arkansas Academy of Sciences, meeting this year on the ATU campus, April 13-14, 2006

G. This committee has not funded this request before, but the approach to isolation of antibiotic-enhancing microbes has been used before at ATU, and has, as noted above, been somewhat successful. More students are working on the project now, and we have a plan for moving beyond previously-achieved results.

H.	Supplies:	498 \$500 from this grant, \$200 from department/ school
	Equipment	0
	Copying/printing	\$150 from department/ school
	Postage	\$50 from department/school
	Travel	0 (since AAS meets at ATU next year)
	Graduate assistants	0
	Student labor	\$1500 + 2.00

I. Bibliography:

Extensive literature citations exist indicating the significance of antibiotic resistance, but the approach proposed here is original, involves relatively "low-tech" approaches, and has not been in the mainstream of current approaches.

Name: Scott W. Kirkconnell
Position/Department: Professor/Biology
Office Telephone: 968-0675
Date of Birth: Feb. 8, 1950
Place of Birth: Minneapolis, Minnesota

Education
Undergraduate

Degree: A.B.
Date: Feb. 15, 1973
Institution: Univ. of Illinois, Urbana
Major: Biology
Sem. Hrs.: 40
First Minor: Chemistry
Sem. Hrs.: 20

Institution Subject/Sem.Hrs.	Date	Months	Graduate Degree/Date	
Indiana U. Micro./81	'73-'76	43	M.A./1976	Major
Minor:Chem./ 6 Indiana U. Major:Micro/113 Minor:Chem/ 6	'76-'78	28	PhD./1978	

Courses taught at ATU

Microbiology
Immunology
Cell Biology
Genetics
Vertebrate Zoology
General Biology
Recombinant DNA Readings
Seminar

Work Experience

Dates

'81-Present

'80-'81

'78-'80

Employment or Occupation

Arkansas Tech University Asst., Assoc.,
Professor of Biology
Baylor College of Medicine Research Associate

Abbott Laboratories Biochemist I

'68-'70

Military Service USAF Weatherman Sergeant

Publications-Scholarly or creative

Title	Publisher or Journal Date	S.
Kirkconnell, N. Caveneau, C Cerniglia, and D. Wennerstrom Fractal Colony Formation by Mycobacterium sp. pyr-1	Presented at ASM South 1994 Central Branch meeting	S.
Friday, E., B.F.Kuntz, W. Kirkconnell, and R.E. Koeppe II In vivo specificity of Gln vs. Trp. aminoacylation of two amber-suppressing mutants of E. coli tRNA (Trp)	Federation of European 1990 Microbiological Societies (FASEB) Journal, v. 4	S.
Fairman, J.C., E. Friday, S.W.Kirkconnell, B.F. Kuntz, and R.E Koeppe II Intracellular Regulation of the tRNA (Trp) : trp-tRNA synthetase molar ratio in Escherichia coli Prior to 1990, various publications relating to carbon monoxide-oxidizing bacteria (PhD. topic), isolation of proteases of Schistosoma mansoni (Research Associate work at Baylor College of Medicine), and collaboration with Dr. Michael DuBow, McGill University, Montreal, Canada on development of patented assays for genotoxic agents.	FASEB Journal, v.4 1990	

Appearance on Programs of Learned Societies
Regional or State

Anna Goodwin, Jennifer Looper, Callie Causey, Amanda Ingle, Sarah Norman	Arkansas Academy of Sciences, and Undergraduate Honors Research Symposium (ATU) 2006
Ashley Mason, Anna Goodwin,	Undergraduate Honors Research Symposium (ATU) 2005

Erica Olsen, and S. Kirkconnell

Lori Sale and S. Kirkconnell

Arkansas Academy of Science April, 1998

82nd Annual Meeting,
UAMS, Little Rock, AR

(This paper, describing the related SILO-funded work
accomplished this year won the award for the best
undergraduate research presentation in
Environmental Science at these meetings)

Lori Sale and S. Kirkconnell
April, 1998

Fifth Annual Arkansas

Undergraduate Research
Conference, Henderson State
University

H. Hawkins, H. Hula,
April, 1996
M. Inomata, D. Smith,
and S. Kirkconnell

Third Annual Arkansas

Undergraduate Research
Conference, Henderson State
University

D. Wennerstrom
S. Kirkconnell

Regional ASM Meeting, Nov. 1994 and
Shreveport, La.

Various other meetings during the 1980s

National

American Society for Microbiology
almost all
National Meeting
since 1976
presented papers at 3 sessions

Attending
sessions

American Society for Tropical Medicine and Hygiene 1980

American Society of Biological Chemists 1981