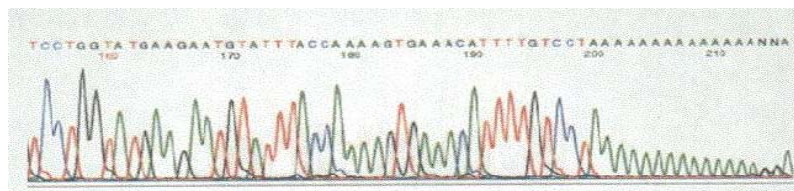


NSF - Biological Sciences

Susan Porter Ridley, Ph.D.
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National Science Foundation
2005



**Directorate for Biological Sciences
(BIO)**

Mary E. Clutter, Assistant Director
Joann Roskoski, Executive Officer

**Virtual Division of
Emerging Frontiers
(EF)**

AToL, FIBR, EID, RCN

**Division of
Biological Infrastructure
(DBI)**

Machi F. Dilworth, Division Director
Muriel Poston, Deputy Division Director

Research Resources

Human Resources

Plant Genome

**Division of
Environmental Biology
(DEB)**

Mike Willing, Division Director
Penny Firth, Deputy Director

Ecological Biology

Ecosystem Science

Population and
Evolutionary Processes

Systematic Biology and
Biodiversity Inventories

**Division of Integrative
Organismal Biology
(IOB)**

Tom Brady, Division Director
Judith Verbeke, Acting Deputy Director

Behavioral Systems

Developmental
Systems

Environmental and
Structural Systems

Functional and Regulatory
Systems

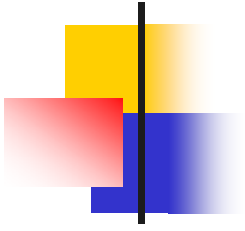
**Division of Molecular and Cellular
Biosciences
(MCB)**

Maryanna Henkart, Division Director
Jerry Cohen, Acting Deputy Director

Biomolecular Systems

Genes and Genome Systems

Cellular Systems



BIO Directorate

- 1. **DEB**: Division of Environmental Biology
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DEB: Division of Environmental Biology

Examples of Research Areas Supported Under DEB

- Systematics
- Population Biology
- Biodiversity Surveys and Inventories
- Partnerships for Enhancing Expertise in Taxonomy (PEET)
- Ecosystems Studies
- Ecology
- Long-term Ecological Research



DEB: Ecosystem Science

- Biogeochemistry
- Decomposition of organic matter
- Belowground nutrient cycling and energy flow
- Primary productivity
- Radiatively active gas flux
- Element budgets on watershed, regional, continental, or global scales;
- Relationships between diversity and ecosystem function
- Ecosystem services
- Landscape dynamics



DEB: Population and Evolutionary Processes

- Population processes
- Evolutionary ecology
- Evolutionary genetics
- Molecular population biology



DEB: Systematic Biology and Biodiversity Inventories

- Taxonomy
- Classification
- Phylogenetics
- Expeditionary work to discovery, document and describe plant, animal, and microbial diversity



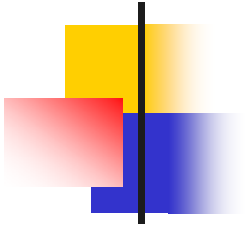
Doctoral Dissertation Improvement Grants

- Division of Environmental Biology and the Division of Integrative Organismal Biology
- Aims to improve the quality of research
- Funds research-related costs only

Due November 18, 2005

Contact: Dr. Mark Courtney, mcourtne@nsf.gov

Announcement: NSF 05-607



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IOB: Research Clusters

- Behavioral Systems
- Developmental Systems
- Environmental and Structural Systems
- Functional and Regulatory Systems




IOB: Behavioral Systems Cluster

- Focuses on the development, function, mechanisms, and evolution of behavior, biological rhythms, and interactions between organisms including animals, plants, and microbes.
 - social and reproductive behavior
 - behavioral ecology and physiology
 - neural and hormonal mechanisms of behavior; immunology of behavior
 - biological bases of learning, cognition, and communication



IOB: Developmental Systems Cluster

- Focuses on the nature, control, and evolution of those processes that comprise the life cycle of organisms.
 - mechanisms of gametogenesis, fertilization, embryogenesis, differentiation, pattern formation, and morphogenesis
 - development, regeneration, and aging of the nervous system
 - genomic approaches, gene networks, integration of developmental gene pathways, and computational approaches are included.



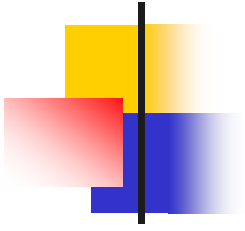
IOB: Environmental and Structural Systems Cluster

- Focuses on the function and evolution of organisms in their physiochemical and biotic environments.
 - physiological ecology
 - functional morphology
 - animal sensation and movement
 - molecular bases of tissue biomechanical properties
 - environmental genomics



IOB: Functional and Regulatory Systems Cluster

- Focuses on fundamental physiological mechanisms and how they have evolved, with emphasis on organisms as integrated systems.
 - comparative physiology
 - neurophysiology
 - mechanisms of solute transport
 - comparative or evolutionary immunology
 - Includes research at the genetic, genomic, cellular, tissue, organ, system, and organismal levels of organization.



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MCB: Division of Molecular and Cellular Biosciences

Examples of Research Areas Supported Under MCB

- Molecular Structure and Function
- Metabolic Biochemistry
- Cellular Organization
- Signal Transduction and Cellular Regulation
- Regulation of Gene Expression
- Genetic Mechanisms



MCB: Research Clusters

- Biomolecular Systems
- Cellular Systems
- Genes and Genome Systems



MCB: Biomolecular Systems Cluster

- Focuses on the structure, function, dynamics, interactions, and interconversions of biological molecules.
 - integration of theoretical, computational, and experimental approaches to the study of biological molecules and their functional complexes
 - mechanistic studies of the regulation and catalysis of enzymes and RNA
 - higher-order characterization of biochemical processes



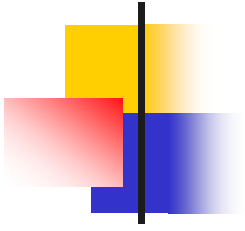
MCB: Cellular Systems Cluster

- Emphasizes the structure, function, and regulation of plant, animal and microbial cells, and their interactions with the environment and with one another.
 - studies of the structure, function, and assembly of cellular elements, including eukaryotic and prokaryotic cell walls and envelopes
 - intracellular and transmembrane signal transduction mechanisms and cell-cell signaling processes, including those that occur in biofilms



MCB: Genes and Genome Systems Cluster

- Focuses on genetic mechanisms in all organisms, whether prokaryote, eukaryote, phage, or virus.
 - structure, maintenance, expression, transfer, and stability of genetic information in DNA, RNA, and proteins and the regulation of those processes
 - genome organization, molecular and cellular evolution, replication, recombination, repair, and vertical and lateral transmission of heritable information
 - processes that mediate and regulate gene expression, such as chromatin structure, epigenetic phenomena, transcription, RNA processing, editing and degradation, and translation



BIO Directorate

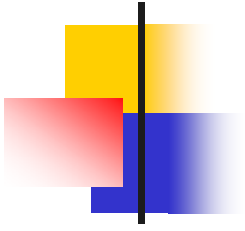
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EF: Virtual Division of Emerging Frontiers

EF seeks to advance scientific research and develop synergy between disciplines by supporting multidisciplinary research and networking activities funded under EF, including the following:

- Frontiers in Integrative Biological Research
- Tree of Life
- Microbial Observatories (MO) and Microbial Interactions and Processes (MIP)
- Microbial Genome Sequencing Project
- Ecology of Infectious Diseases



EF: Further Activities

Human and Social Dynamics

Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences

Mathematical Sciences: Innovations at the Interface with the Sciences and Engineering

Joint DMS/BIO/NIGMS Initiative to Support Research in the Area of Mathematical Biology

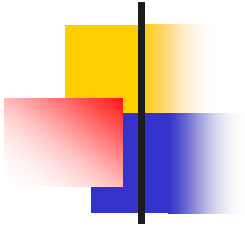
National Evolutionary Synthesis Center (NESCent)



EF FIBR: Frontiers in Integrative Biological Research

- **Supports research that**
 - **Addresses major under-studied and unanswered questions in biology**
 - **Uses innovative approaches**
 - **Integrates science and research tools across disciplines**
- **PRELIMINARY PROPOSAL DEADLINE (required for Full Research Proposal submission only): October 3, 2005**
- **Full research target date: February 15, 2006**

Program Announcement: NSF 05-597



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DBI: Division of Biological Infrastructure

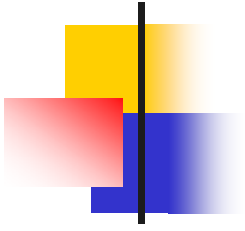
Areas Supported By DBI

- Human Resources Cluster
- Research Resources Cluster
- Plant Genome Research Program
- National Ecological Observatory Network (NEON)
- Additional Opportunities



DBI: Human Resources Cluster

- Research Experiences for Undergraduates Sites
- Undergraduate Mentorship in Environmental Biology
- Collaborative Research at Undergraduate Institutions
- Postdoctoral Fellowships Programs
- Cross-disciplinary Research at Undergraduate Institutions



DBI: Research Resources Cluster

- Biological Databases and Informatics
- Living Stock Collections
- Postdoctoral Fellowships Programs
- Biological Research Collections
- Biological Field Stations and Marine Laboratories
- Instrument Development for Biological Research



DBI: Additional Opportunities

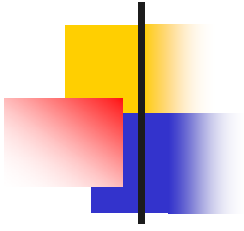
- Arabidopsis 2010 Project
- Research Initiation Grants & Career Advancement Awards to Broaden Participation in the Biological Sciences



DBI:Plant Genome Research Program

Program Goals

- Support research on the structure, organization and function of plant genomes, elucidate fundamental biological processes
- Accelerate the acquisition and utilization of new knowledge and innovative technologies
- Focus on plants of economic importance and plant processes of potential economic value.



DBI: National Ecological Observatory Network NEON

A blueprint and implementation plan for the following is being developed:

- A continent-wide research tool consisting of geographically distributed **regional observatories**, networked via state of the art communications
- A virtual lab for research to obtain a predictive understanding of the environment
- Collectively, a network of networked environmental research facilities and instruments



BIO Directorate: Award Supplement Opportunities

- Research Experiences for Teachers (RET)
- Research Experiences for Undergraduates (REU)
- Research Opportunity Awards (ROA)
- Research Assistantships for Minority High School Students (RAMHSS)
- Facilitation Award for Scientists and Engineers with Disabilities



RESEARCH EXPERIENCE FOR TEACHERS

- **1-year supplement to current NSF Awards**
- **help build long term collaborative relationships between K-12 teachers of science and mathematics and the NSF research community**
- **encourages researchers to form partnerships with teachers at inner city schools and less well-endowed school districts**

Consult with the Program Director of your particular NSF award.
Dear Colleague Letter: NSF 05-524



Research Experiences for Undergraduates

**Provision of support for active research experience
for undergraduates**

REU sites

REU supplements for PIs with existing awards



Research Opportunity Award

Supplementary funding through ongoing NSF research grants to allow faculty at predominantly undergraduate institutions or secondary schools to participate in research activities under the aegis of NSF-supported investigators

- **details located within the RUI program announcement**

**Consult with the Program Director of your particular NSF award.
Dear Colleague Letter: NSF 05-548**



Research Assistantships for Minority High School Students (RAMHSS)

- **involves high school minority students in research**
- **provides funding supplements to PIs supported by NSF**
- **occurs throughout the academic year and summer**

Contact the Program Officer in the appropriate program for details.



Useful URLs

NSF Home Page:

<http://www.nsf.gov>

Search NSF Awards:

<http://www.nsf.gov/awardsearch/>

Search NSF Documents On-Line:

<http://www.nsf.gov/publications/ods/>

FastLane Home Page:

<https://www.fastlane.nsf.gov/fastlane.jsp>

NSF Custom News Service:

<http://www.nsf.gov/mynsf/>

Grant Proposal Guide (GPG):

http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf0423

Guide to Programs:

http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf04009