



National Science Foundation
WHERE DISCOVERIES BEGIN

NSF Funding Opportunities in Biological Sciences

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Division of Molecular and Cellular
Biosciences



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(BIO)
James Collins, Assistant Director
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Division of
Biological
Infrastructure
(DBI)

Human
Resources

Research
Resources

Plant Genome
Research Program

Division of
Environmental
Biology
(DEB)

Ecological Biology

Ecosystem
Science

Population &
Evolutionary Processes

Systematic Biology &
Biodiversity Inventories

Division of
Organismal
Systems
(IOS)

Behavioral
Systems

Developmental
Systems

Environmental &
Structural Systems

Functional &
Regulatory Systems

Division of
Molecular and
Cellular
Biosciences
(MCB)

Biomolecular
Systems

Cellular Systems

Genes and Genome
Systems

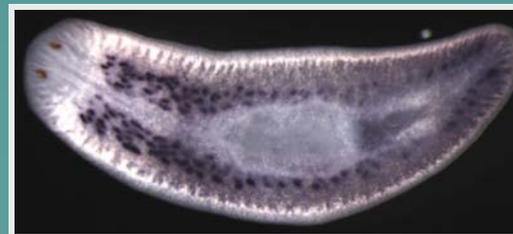
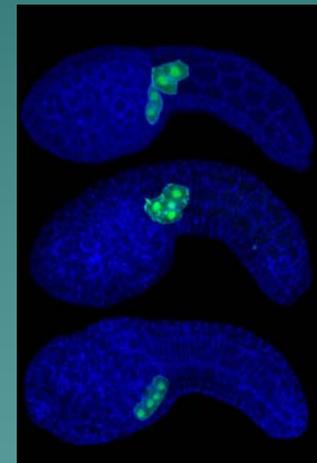
Emerging Frontiers (EF)

Integrative Organismal Systems (IOS)

- ◆ Behavioral Systems Cluster
- ◆ Developmental Systems Cluster
- ◆ Neural Systems Cluster
- ◆ Physiological and Structural Systems Cluster

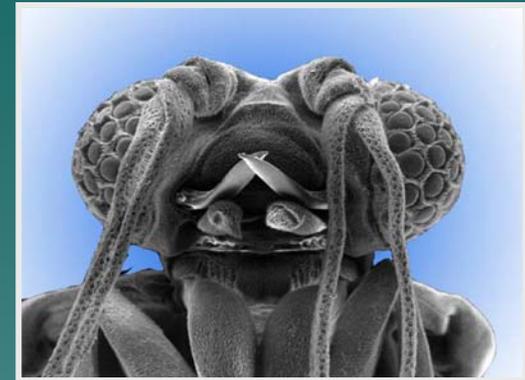
Integrative Organismal Systems (IOS)

- ◆ Behavioral Systems
 - Vertically Integrated Understanding of Animal Behavior
- ◆ Developmental Systems Cluster
 - Plant, Fungal, and Microbial Developmental Systems
 - Animal Development Systems
 - Evolution of Development Systems

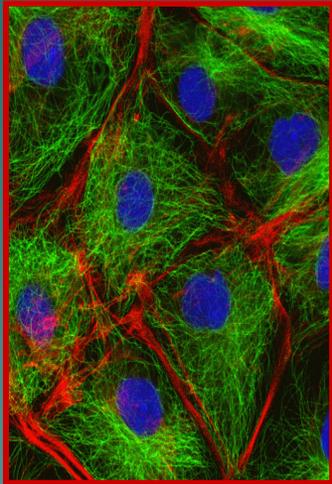


Integrative Organismal Systems (IOS)

- ◆ Neural Systems Cluster
 - Organization
 - Activation
 - Modulation
- ◆ Physiological and Structural Systems Cluster
 - Symbiosis, Defense, and Self-Recognition
 - Processes, Structures, and Integrity
 - Organism-Environment Interactions



Division of Molecular and Cellular Biosciences (MCB)



Fundamental understanding of life processes at the molecular, subcellular, and cellular levels

◆ Biomolecular Systems

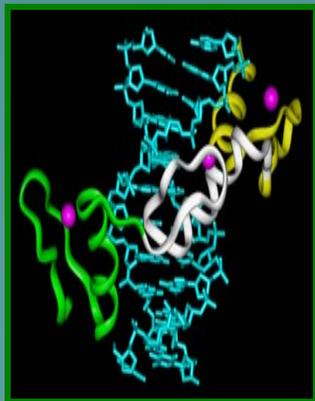
- Structure, function, dynamics, interactions, and interconversions of biological molecules

◆ Cellular Systems

- Emphasizes the structure, function, and regulation of plant, animal and microbial cells, and their interactions with the environment and with one another

◆ Genes and Genome Systems

- Emphasizes genomes and genetic mechanisms in all organisms, whether prokaryote, eukaryote, phage, or virus



MCB: Biomolecular Systems Cluster

Structure, function, dynamics, interactions, and interconversions of biological molecules

- Integrating 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 the biochemical processes

MCB: Cellular Systems Cluster

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
- Microbial Observatories and Microbial Interactions and Processes

MCB: Gene and Genome Systems Cluster

Genomes and 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 how those processes are regulated
- 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.



DEB Organization - 4 Clusters

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Continuation of Core Panels in DEB

Proposal core areas:

* * Biodiversity Surveys and Inventories (BS&I)

* * Systematic Biology

* Ecological Biology

* Ecosystem Science

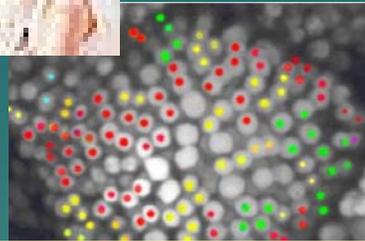
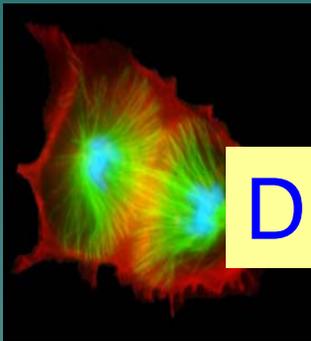
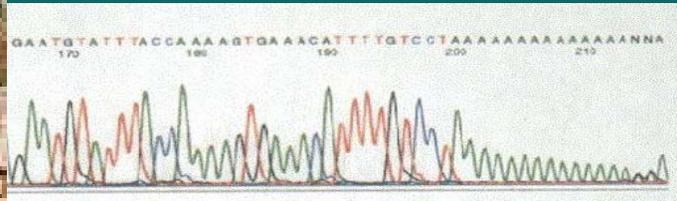
Long-Term Ecological Research (LTER)

Long-Term Research in Environmental Biology
(LTREB)

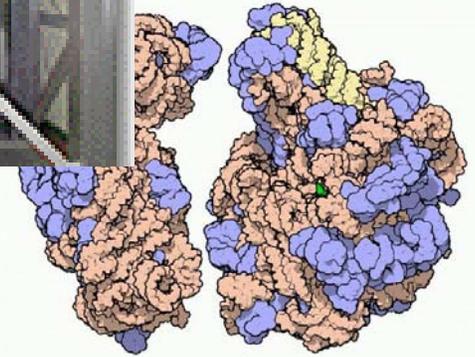
* Population And Evolutionary Processes (PEP)

Additional opportunities thru DEB

- ◆ Doctoral Dissertation Improvement Grants (DDIG) **Announcement: NSF 05-607**
- ◆ Opportunities for Promoting Understanding through Synthesis (OPUS) **NSF 05-572**
- ◆ Partnerships For Enhancing Expertise In Taxonomy **NSF 07-519**
- ◆ Ecology of Infectious Diseases (EID) **NSF 07-513**
- ◆ Assembling the Tree of Life Project (AToL) **NSF 07-535**
- ◆ Planetary Biodiversity Inventories (PBI) **NSF 06-500**



Division of Biological Infrastructure





DBI Responsibilities

Tools and resource development

- **Instrumentation – access to the latest instrumentation, and develop new capabilities**
- **Resources - database/knowledge-base, biological resources to be mined for new insights and discoveries**
- **Informatics - power to mine all available resources**

Training

- **Train new generation of scientists who are open to new and different approaches and ideas across scale, disciplines, and other cultural and physical boundaries (fearless scientists)**



DBI Programs

Research Resources Cluster

Biological Field Stations and Marine Laboratories (FSML)

Instrument Development for Biological Research (IDBR)

Biological Databases and Informatics (BDI)

Biological Research Collections (BRC)

Living Stock Collections (LSC)

Also participates in:

Arabidopsis 2010, Research Coordination Networks (RCN)

Training Cluster

Postdoctoral Research Fellowships

Research Experiences for Undergraduate (REU) Sites

Undergraduate Research and Mentoring in Biological Science (URMBS)

Also participates in:

ADVANCE, IGERT, GK-12, PASI, CAREER, RUI

Also manages:

Plant Genome Research

National Ecological Observatories Network (NEON)

NAS proposals

Major Research Instrumentation (MRI)



DBI Programs/Training Cluster

Postdoctoral Research Fellowships

- **Minority Postdoctoral Research Fellowships, and Travel Awards (joint with SBE)**
- **Biological Informatics Postdoctoral Research Fellowships**

Research Experiences for Undergraduate (REU) Sites

- **NSF wide activity, check solicitation for criteria**

Undergraduate Research and Mentoring in Biology (URM)

- **Preproposal required**
- **Support students in research activities**
- **Part of Broadening Participation activities to increase activities of underrepresented minorities in Biology**

Research Initiation Grants/Career Advancement Awards

- **Bio wide activity, coordinated through DBI and a working group**
- **Review handled within the appropriate programs**
- **Part of BP activities aimed at faculty during career**



DBI Programs/Research Resources Cluster

Biological Field Stations and Marine Laboratories

- **BIO/GEO joint activity**
- **Funds improvements to stations based on amount of research activity**
- **Support includes construction**

Instrument Development for Biological Research

- **Must be new development, not iterative**
- **Support only the hardware and associated software development (not methods)**

Biological Databases and Informatics

- **Informatics tools development for data management**
- **Bioinformatics research**
- **Large community information resources**

Major Research Instrumentation

- **NSF crosscutting activity**
- **Supports acquisition or development of equipment**
- **Cost sharing required for Research intensive institutions**
- **Primarily undergraduate institutions separate criteria**



DBI Programs/Research Resources Cluster (Cont'd)

Biological Research Collections

- **Supports vouchered collections and their components**
- **Covers natural history collections, preserved specimens, molecular reagents**
- **Improvements to existing collections, databasing, and curatorial techniques**
- **Strong emphasis on making the data/information available**

Living Stock Collections

- **Collections resulting from basic research activities**
- **Actively used collections, not archival**
- **Supports operation and maintenance of existing collections**
- **Provides short-term support for suddenly orphaned collections**

Arabidopsis 2010

- **Resource (mutant collections, FL-cDNAs) development**
- **Tools (technique, software) development**