HBCU-UP: EXCELLENCE IN RESEARCH (EIR)

Supporting STEM and STEM education projects at HBCUs that are research focused and enhance research capacity

You will not be able to speak during the presentation. If you have questions you can submit them using the Q&A function.
AGENDA

1. Introduction of National Science Foundation Panel of Program Directors
2. HBCU-UP EiR and RIA background and important information
3. Description of the four divisions within NSF’s BIO Directorate
4. Questions from webinar participants
HBCU-UP: EXCELLENCE IN RESEARCH (EIR) AND RESEARCH INITIATION AWARD (RIA)

EiR and RIA aim to accelerate support of research at HBCUs across the National Sciences Foundation’s full portfolio
The HBCU Excellence in Research (EiR) component in HBCU-UP was developed in response to Congressional mandate to increase support for research at HBCUs.

- Awards can be single investigator or collaborative

- Important dates
  - Letter of Intent: 4th Thursday in July (July 23, 2020)
  - Full EiR proposal: 1st Tuesday in October (Oct 6, 2020)
A Letter of Intent (LOI), submitted through FastLane, must be received by July 23, 2020

✓ See NSF solicitation 20-542 for full guidance
✓ Indicate type of proposal to be submitted (e.g. Excellence in Research)
✓ Minimum of 1 and maximum of 4 senior project personnel
✓ Project synopsis (no more than 500 words) that describes proposed research and/or implementation activities
✓ Indicate which NSF program(s) you believe to be most appropriate to review the EiR project
The HBCU Excellence in Research Initiation Award (RIA) component of HBCU-UP was developed to provide support to STEM faculty with no prior or recent research funding.

- Provides up to $300k, for up to 3 years of support:
  - Must include undergraduates in the research experience
  - Can conduct research at home institution, national laboratory, NSF-funded research center, or research-intensive institution

- Important dates
  - Letter of Intent: 4th Tuesday in July (July 28, 2020)
  - Full RIA proposal: 1st Tuesday in October (Oct 6, 2020)
A Letter of Intent (LOI), submitted through FastLane, must be received by July 28, 2020

- See NSF solicitation 20-559 for full guidance
- Indicate type of proposal to be submitted (e.g. Research Initiation Award)
- **Only PI can be listed under senior personnel**
- Project synopsis (no more than 500 words) that describes proposed research and/or implementation activities
NSF ORGANIZATIONS PARTICIPATING IN EIR

• Directorate for Biological Sciences (BIO)
• Directorate for Computer and Information Science and Engineering (CISE)
• Directorate for Education and Human Resources (EHR)
• Directorate for Engineering (ENG)
• Directorate for Geosciences (GEO)
• Directorate for Mathematical and Physical Sciences (MPS)
• Directorate for Social, Behavioral and Economic Sciences (SBE)
• Office of Integrative Activities (OIA)
“To enable discoveries for understanding life, advance the frontiers of biological knowledge, increase our understanding of complex systems, and provide a theoretical basis for original research in many other scientific disciplines.”
WHAT DOES EACH DIVISION ‘DO’?

Division of Biological Infrastructure (DBI)

Supports infrastructure (research and human resources) for contemporary research in biology

Division of Environmental Biology (DEB)

Supports fundamental research on the origins, functions, relationships, interactions, and evolutionary history of populations, species, communities, and ecosystems

Division of Integrative Organismal Systems (IOS)

Supports research aimed at understanding the living organism -- plant, animal, microbe -- as a unit of biological organization

Division of Molecular and Cellular Biosciences (MCB)

Fundamental research across the molecular, subcellular and cellular scale
Navigating the BIO Pages on NSF.GOV
Division of Biological Infrastructure
DBI

Human Resources

Supporting the training of next generation of scientists

- Research Coordination Networks in Undergraduate Biology Education (RCN-UBE)
- REU sites
- Postdoctoral Research Fellowships in Biology (PRFB)

Research Resources

Supporting the infrastructure that makes science possible

- Innovation (IIBR)
- Capacity (ICB)
- Sustaining (SABI)
- Advancing Digitization of Biodiversity Collections
- NEON (National Ecological Observatory Network)

REU Site:
Nanobioengineering
Alabama State University
Award: 1659166

Photo Courtesy David Campbell/Alabama State University
A LIFE CYCLE OF RESOURCES FOR INFRASTRUCTURE

Infrastructure Innovation for Biological Research

Infrastructure Capacity for Biology

Sustained Availability of Biological Infrastructure

- Instrumentation and associated methods
- Biological informatics
- Rules of life
- Multidisciplinary

- Cyber-infrastructure
- Collections
- Instrument capacity
- Improvements to field stations marine labs

- Experimental or observational facilities
- Instrumentation
- Cyberinfrastructure

- Biological living stocks
DBI: 1901793
Excellence in Research: Deep Learning based approaches for protein post-translational modification site prediction

PI: Robert Newman
North Carolina Agricultural & Technical State University
We support basic research projects that contribute to the development of the fields of evolutionary biology and ecology.

This includes biodiversity sciences and evolutionary processes as well as ecosystem and population and community ecology.
PROGRAM OFFICERS IN THE DIVISION OF ENVIRONMENTAL BIOLOGY (DEB) 2020
ECOLOGY CLUSTERS

Population and Community Ecology

• Supports research that advances the conceptual or theoretical understanding of population ecology, species interactions, and community dynamics.
• Topics include: mutualist and parasitism, mechanisms of coexistence, community assembly, paleoecology, landscape ecology, conservation and restoration biology, behavioral ecology and macroecology.

Ecosystems Science

• Supports research on ecosystem structure and function across a diversity of spatial and temporal (including paleo) scales.
• Topics include: ecosystem dynamics, resilience, material and energy fluxes and transformations, linkages among ecosystems in space, time and across spatial and temporal scales, roles and relations of ecosystem components.
**EVOLUTION CLUSTERS**

**Evolutionary Processes**

- Supports empirical or theoretical research that makes inferences about evolutionary dynamics and consequences
- Appropriate scales: molecules to species
- All mechanisms of evolution are of interest

**Systematics and Biodiversity Science**

- Supports research to advance our understanding of the diversity, systematics, and evolutionary history of extinct or extant organisms in natural systems. Includes:
  - Expeditionary and exploratory research to advance discovery and classification of biodiversity
  - Research to resolve questions of relationships among taxa
  - Phylogeny-based studies of character evolution and comparative biology
BEE TRACK
BRIDGING ECOLOGY & EVOLUTION

• Applies to all DEB core programs
• Targets research that spans ecology and evolution
  • Welcomes proposals that reciprocally address hypotheses in both disciplines
SOME RECENTLY FUNDED HBCU-EIR PROJECTS IN DEB

1655957: Jennifer Kovacs, RUI: Evolutionary and ecological impacts of horizontal gene transfer in arthropods

1831958: Yonas Tekle, Excellence in Research: Genome Evolution of Amoebozoa: Resolving the deep phylogeny of Amoebozoa through genomic and proteomic features.

1832140: Courtney Robinson, Excellence in Research: Contribution of Terrestrial Bacteria to Iodine Biogeochemical Cycling

1900885: Jianwei Li, Excellence in Research: Mechanistic Prediction of Soil Microbial Response to Temperature Change
DIVISION OF INTEGRATIVE ORGANISMAL SYSTEMS (IOS)

Supports research to understand how organisms develop, function and behave through interactions among genotypes, and between genotypes and environments

- Behavioral Systems
- Developmental Systems
- Neural Systems
- Physiological and Structural Systems
- Plant Genome Research Program
- Enabling Discovery through Genomic Tools Program
INTEGRATIVE ORGANISMAL SYSTEMS

• Behavioral Systems Cluster
  • Jodie Jawor jjawor@nsf.gov

• Developmental Systems Cluster
  • Plant, Fungal & Microbial Mechanisms Program
  • Animal Development Mechanisms Program
  • Evolution of Developmental Mechanisms Program
  • Steve Klein sklein@nsf.gov

• Neural Systems Cluster
  • Organization Program
  • Activation Program
  • Modulation Program
  • Floh Thiels ethiels@nsf.gov
INTEGRATIVE ORGANISMAL SYSTEMS

• Physiological and Structural Systems Cluster
  • Symbiosis, Defense and Self-recognition Program
  • Physiological Mechanisms and Biomechanics Program
  • Integrative Ecological Physiology Program
  • NSF-NIFA Plant Biotic Interactions Program
  • Kathy Dickson kdickson@nsf.gov

• Plant Genome Research Program
  • Research-PGR Track
  • TR Tech-PGR Track
  • Postdoctoral Fellowships
  • Gerald Schoenknecht gschoenk@nsf.gov
ENABLING DISCOVERY THROUGH GENOMIC TOOLS, EDGE (NSF 20-532)

- **Functional Genomic Tools track:** for developing tools for gene manipulation and/or phenotyping, analytical approaches or infrastructure to overcome one or more blocks to direct tests of gene function

- **Complex Multigenic Traits track:** for hypothesis-driven research to understand causal mechanisms connecting genomes and complex multigenic organismal phenomes across environmental, developmental, social, and/or genomic contexts

BIOEDGE@NSF.GOV
DIVISION OF MOLECULAR AND CELLULAR BIOSCIENCES (MCB)

Supports fundamental research and related activities designed to promote understanding of complex living systems at the molecular, subcellular, and cellular levels.

The Division welcomes proposals that incorporate theories and concepts from physics, mathematics, chemistry, engineering and computer science in search of the most fundamental Rules of Life, as well as proposals that offer technological innovations to enable cross-cutting research activities.
MOLECULAR BIOPHYSICS CLUSTER

Research Focus: Integration of computational and experimental approaches to understand the physical principles that govern biological systems from molecules to cells.

- Large scale (millions of atoms) computations incorporating experimental constraints, using a variety of techniques.
- Methodological developments providing insight into molecular dynamics on multiple timescales, with a goal of understanding roles in molecular recognition and function.
- Determination of the structure and interactions of very large assemblies (e.g., ribosomes, photosystems) at high resolution.
Funding priority for proposals that employ quantitative frameworks & promise high-impact advances in:

- Chromatin- and RNA-mediated regulatory mechanisms.
- Dynamics and spatiotemporal coordination of genome replication, DNA repair, chromatin modification, transcription, and translation.
- Origin and evolution of genetic polymers, including DNA, RNA and proteins
Encourages proposals in the following areas:

- Predictive understanding of the behavior of living cells through integration of modeling and experimentation.
- Evolutionary approaches to understanding the rules governing cellular functions.
- Integration of function with emerging cellular properties across broad spatiotemporal scales.
Encourages proposals in the following areas:

- Systems-level analysis of regulatory, signaling, and metabolic networks, including the interactions among networks.
- Synthetic biology approaches for understanding the origin of life, the minimal cell and emerging behaviors of complex interactions.
- Experimental and computational tool development to facilitate systems and synthetic biology studies.
- Microbiome studies with the potential to reveal rules of assembly and function in well-defined natural and synthetic communities using systems and synthetic biology approaches.
BLOG pages for BIO Divisions:

• DBI: https://dbiblog.nsfbio.com/
• DEB: https://debblog.nsfbio.com/
• IOS: https://iosblog.nsfbio.com/
• MCB: https://mcbblog.nsfbio.com/