Research Resources Programs in the Division of Biological Infrastructure

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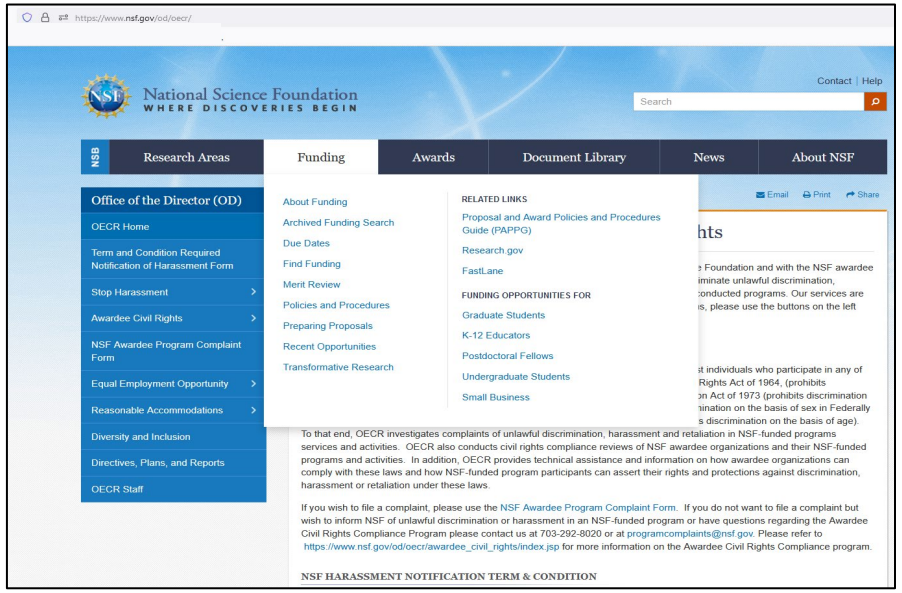
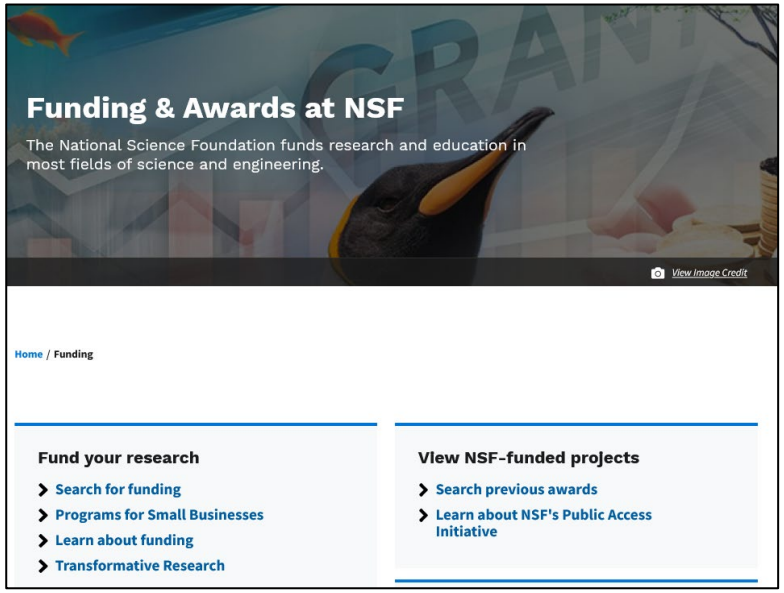
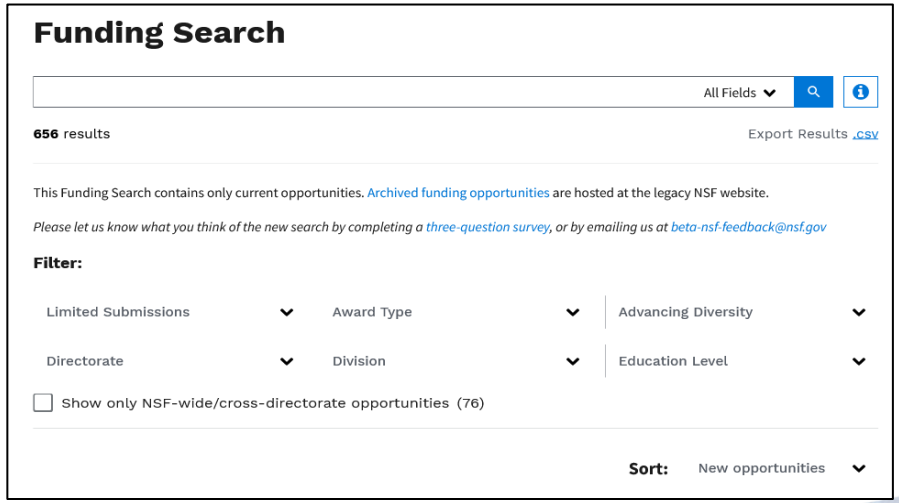
Slides and recaps will be posted on nsf.gov and the DBI blog, dbiblog.nsfbio.com

How to Find Funding Opportunities

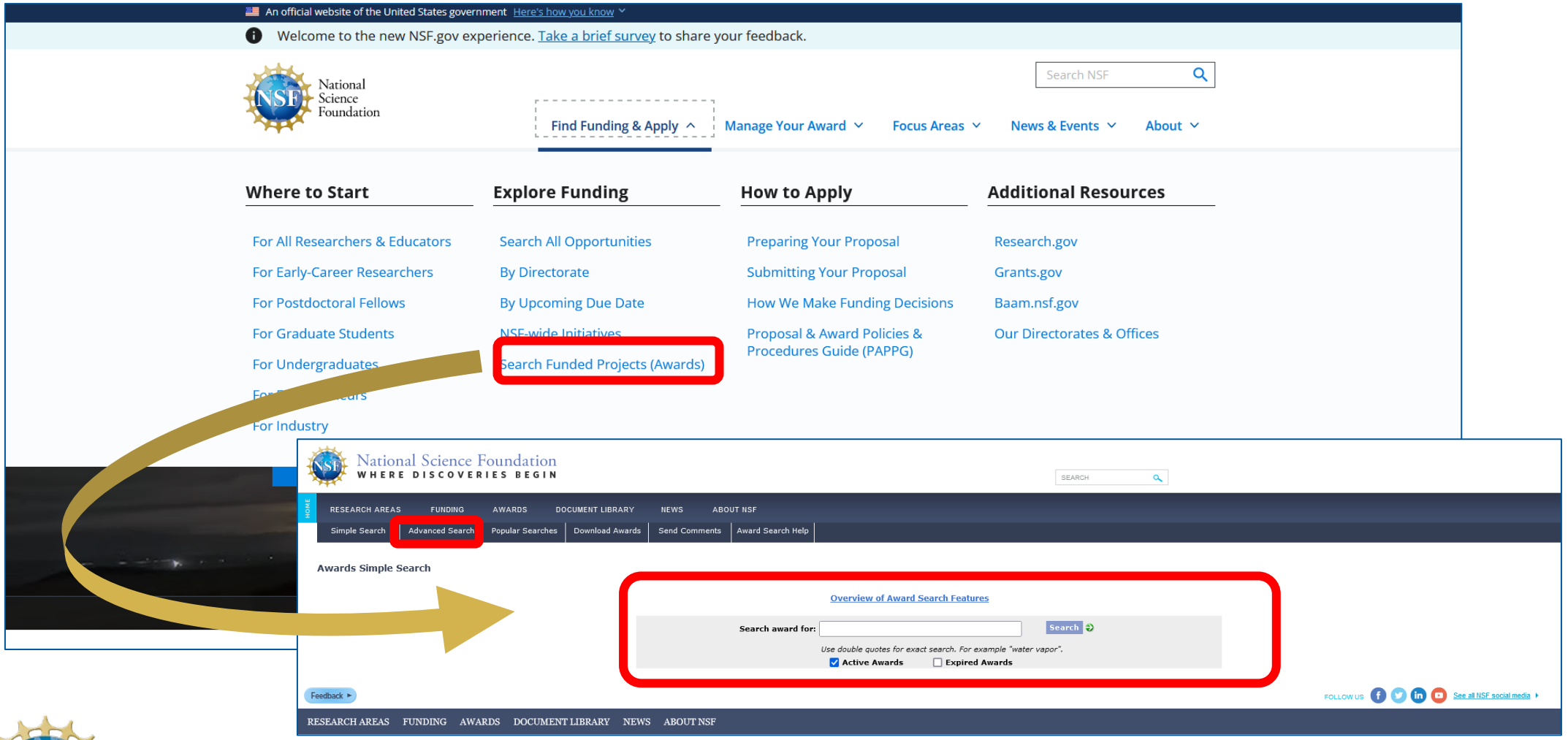






https://beta.nsf.gov/funding/opportunities

Where Does My Research Fit?



Directorate for Biological Sciences (BIO)

Division of Environmental Biology (DEB)

- Ecosystem Sciences
- Evolutionary Processes
- Population and Community Ecology
- Systematics and Biodiversity Science

Division of Integrative Organismal Systems (IOS)

- Behavioral Systems
- Developmental Systems
- Neural Systems
- Physiological and Structural Systems
- Plant Genome Research Program

Division of Molecular and Cellular Biosciences (MCB)

- Cellular Dynamics and Function
- Genetic Mechanisms
- Molecular Biophysics
- Systems and Synthetic Biology

Division of Biological Infrastructure (DBI)

- Research Resources
- Human Resources
- Centers, Facilities, and Additional Research Infrastructure

"To enable discoveries for understanding life, advance the frontiers of biological knowledge, and provide a theoretical basis for prediction within complex, dynamic living systems through an integration of scientific disciplines."

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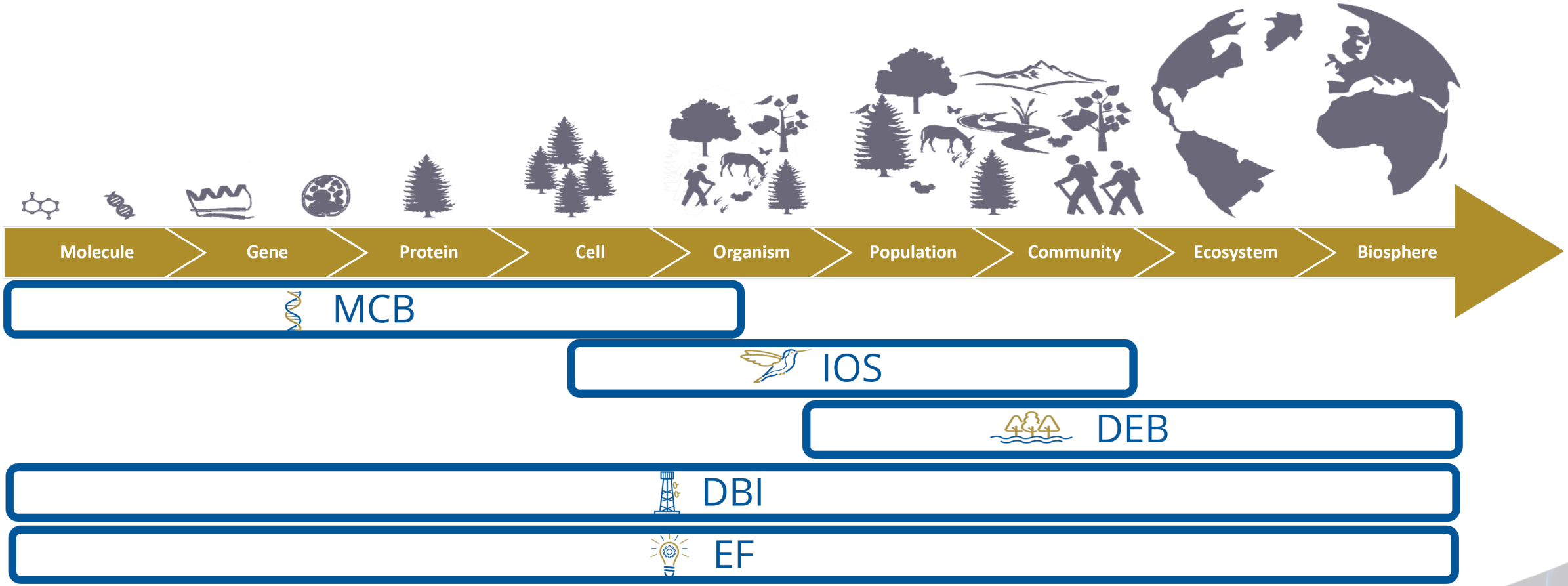
How the BIO Divisions Support Research Across Scales



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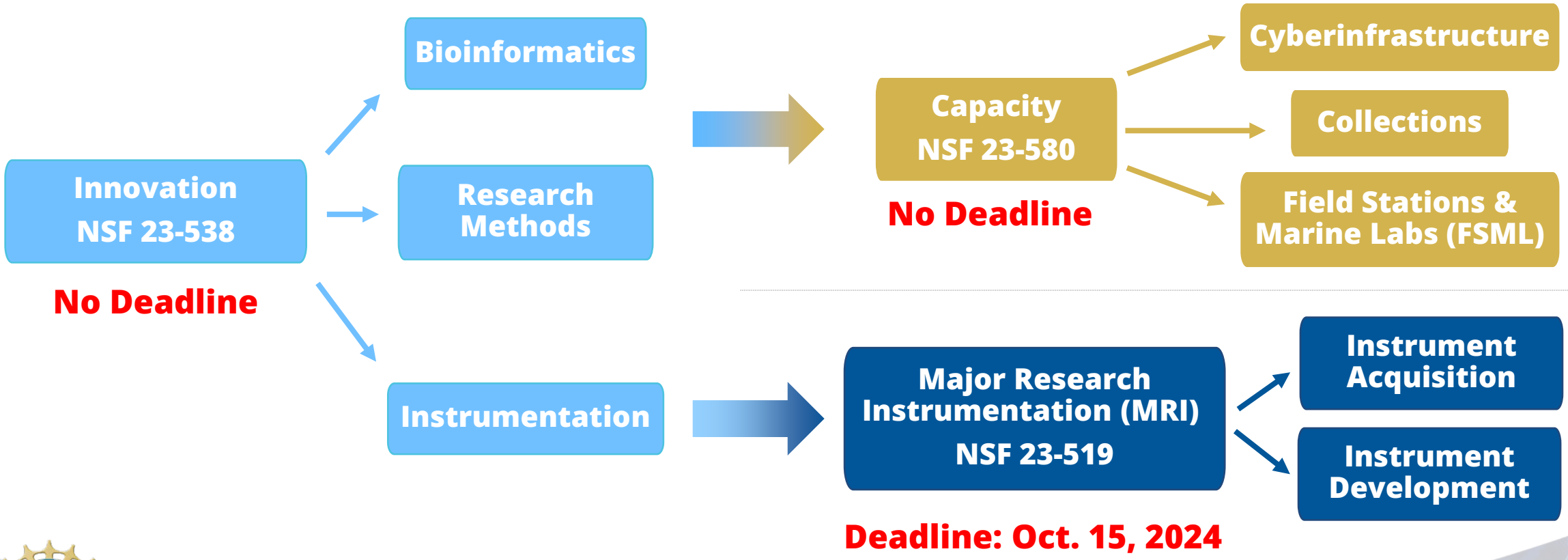
DBI's Research Resources Cluster

Research Resources Infrastructure

New idea to transform biology research

Researchers love it! Need to scale up & out



Infrastructure Innovation for Biological Research

- **Synopsis**
  - Support research to design **novel or greatly improved research tools** and methods that advance contemporary biology as supported by NSF-BIO
- **Programmatic Areas**
  - Innovation: Bioinformatics
  - Innovation: Instrumentation
  - Innovation: Research Methods
- **Program Information**
  - Duration of projects: usually 3 years
  - Number of Awards: 20 to 40
  - Anticipated Budget: $16M to $20M

Innovation: Instrumentation

- **Goal**

  Supports the design of novel and innovative instrumentation and associated methods that are responsive to well-defined research problems supported by NSF/BIO

- **Priorities**
  - A significant application to one or more biological science questions
  - Potential to be used by a community of researchers beyond a single research team
  - Projects may include instrumentation for observing any level of biological phenomena (e.g., molecular, cellular, organismal, ecosystem, biome)
  - Represents a significant advancement over currently available instruments

Innovation: Research Methods

- **Goal**

  Supports the design of novel and innovative laboratory- or field-based methodologies that are responsive to well-defined research problems supported by NSF/BIO

- **Priorities**
  - A significant application to one or more biological science questions
  - Potential to be used by a community of researchers beyond a single research team
  - Including any method for measurement, perturbation, or analysis of biological systems in the lab or field
  - Not supported: refinement, optimization, or scaling of existing methods and validation of new reagents for standard approaches (e.g., new antibodies or fluorescent tags).

Innovation: Bioinformatics

- **Goal**

  Seek pioneer new approaches to the application of informatics to biological problems

- **Priorities**
  - Creating computational/informatics tools and database architectures that are applicable to a **broad range** of biological research questions
  - High degree of novelty and potential impact
  - Publication of new methodologies, proof of concept, or production of a prototype for further development
  - Solve challenging, high-risk problems

Innovation

- Solicitation – Specific Review Criteria
  - Use-case(s) and competitive analysis: Clear need and advance over currently available resources (transformative potential)
  - User discovery: Identification of the NSF/BIO biological user community
  - Design/development/prototype testing plans
  - Community/user feedback plan
  - Communication and Dissemination plan: How will products be shared.
  - Management and assessment plans: Milestones, problems, and adjustments.

Infrastructure Capacity for Biology (Capacity)

- **Synopsis**

  Support the implementation of, scaling of, or major improvements to research tools, products, and services that advance contemporary biological research.

- **Programmatic Areas**
  - Capacity: Cyberinfrastructure
  - Capacity: Biological Collections
  - Capacity: Field Stations & Marine Labs (FSML)
- **Program Information**
  - Anticipated Budget: $18M to $20M
  - Number of Awards: 50 to 75

Capacity: Cyber Infrastructure (previously CIBR)

- **Goal**

  Provide robust cyberinfrastructure that will enable transformative biological research

- **Priorities**
  - Finished product that will have demonstrable impact
  - User engagement, design quality, engineering practices, management plan, and dissemination
  - Bringing a proof of concept into a robust, broadly-adopted cyberinfrastructure

Capacity: Field Stations and Marine Labs (FSML)

- **Goal**

  Supports major improvements to biological field stations or laboratories in any terrestrial, marine, estuarine, or freshwater environment for research and education.

Proposals should focus on well-defined and significant efforts rather than a compilation of small improvements.

- **Improvement Grants**
  - Improvements in the physical plant of a field station or marine laboratory.
- **Planning Grants**
  - Strategic planning for advancing science and education activities at a site or network of sites.

Capacity: Biological Collections (previously CSBR)

- **Goal**
  - Support major improvements to or digitization of biological collections and collection-based information increasing the broader applicability of collections
- **Priorities**
  - Enhance, secure, and improve existing research collections
  - Improve the accessibility of collection-related data
  - Develop capacity for curation and collection management
  - Transfer ownership of collections that are significant to the NSF BIO-funded research community
- **Types of [non-federal] biological collections supported**
  - Living stock/culture collections
  - Natural history voucher collections
  - Jointly-curated ancillary collections such as preserved tissues and libraries of genetic and genomic materials

Capacity

- Solicitation – Specific Review Criteria

  - Rationale: How compelling is the case to advance to biological research, and significance to the targeted user community?
  - Design and implementation: Compelling case for success? Does it align with relevant community standards?
  - Project Management: Clear projects activities and strong team?
  - Communication and dissemination: How engaging with target audience/users? Accessibility?
  - Outcomes Assessment: How has success been defined and what are the milestones?
  - Sustainability: How will the resource be sustained and what would be needed to ensure that?

Major Research Instrumentation MRI:

Program

- Assists with the **acquisition** or **development** of a shared research instrument.
- Generally, these instruments are too costly or not appropriate for support through other programs.

Goals

- Increase access to shared scientific & engineering instruments for research & training.
- Foster the integration of research & education in research-intensive learning environments.

Major Research Instrumentation MRI:

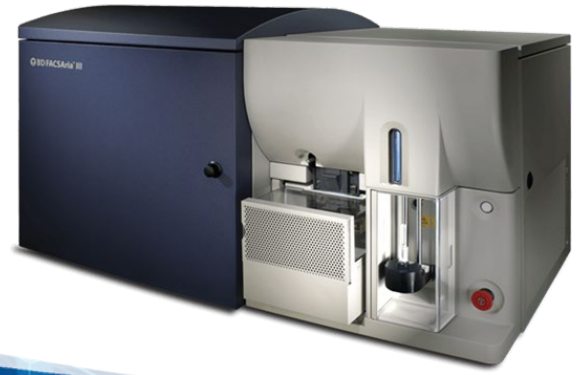
Budget

- Three submission tracks:
  - Track 1: $100,000 < $1,400,000. → **2/organization**.
    < $100,000 from non-Ph.D.-granting institutions only.
  - Track 2: $1,400,000 – $4,000,000 & must be a regional resource. → **1 /organization**.
  - Track 3: Instrumentation that will reduce helium consumption. → **4 /organization**.
- The **Chips and Science Act (2022)** eliminated the cost share (30% of the total project) for PhD- & non-PhD-granting institutions (5 years; 2023–2027).

Major Research Instrumentation MRI:

Solicitation-Specific Review Criteria

- Management plan.
- Impact statement indicating the extent to which the project will:
  - Substantially improve the organization's capabilities to conduct leading-edge research.
  - Provide research experiences for students using leading-edge capabilities.
  - Broaden the participation in science & engineering research (especially as lead PIs) by women, underrepresented minorities, persons with disabilities & early-career investigators.



Major Research Instrumentation MRI:

Instrument Acquisition

- Instrument purchase, installation, commissioning & calibration.
- A demonstrated need for the purchase or upgrade of a generally available (yet sophisticated) instrument with little or no modification.
- A purchase requiring limited personnel that enables work with limited risk.
  - A single instrument of a given type & essential peripherals for a specified purpose.
  - Direct & indirect costs of maintenance & calibration during the award period.
  - Training support for proper operation & maintenance is allowed.

Major Research Instrumentation MRI:

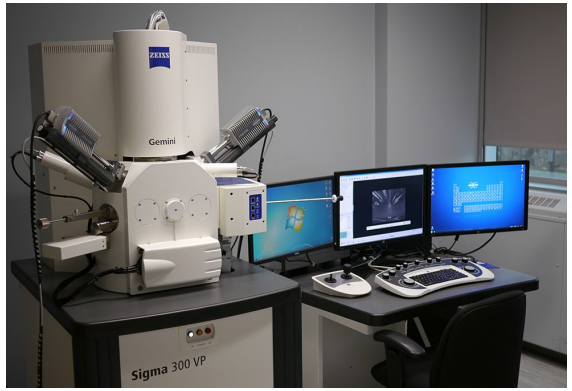
Instrument Development

- Build a new or extensively upgraded instrument for a well demonstrated need.
- Provide enhanced or potentially transformative use & performance, *e.g.*, new metrics, improved accuracy, speed, resolution, capacity, ease of use, etc.
- Potential to open new areas of research or research training.
- Sustainability plan for the innovation, *e.g.*, commercial possibilities.
- Support to cover all phases of design, construction, testing & commissioning.
    - Direct & indirect costs associated with support of personnel engaged strictly in the instrument development effort.

Major Research Instrumentation MRI:

Instrument Acquisition Review Criteria

- How will time be allotted for users, shared-use research, research training & education?
  - Does the plan include sufficient training and scheduling time on the instrument?
  - For Track 2 proposals, is there a plan for regional/national access to the instrument?
- Does the organization commit to ensuring successful operation & maintenance over the expected lifetime of the instrument?
- Are the enabled research projects compelling?
- Is the budget request appropriate & well-justified?
- Is student involvement with operation & maintenance justified with respect to instrument needs & training of next gen instrumentalists?



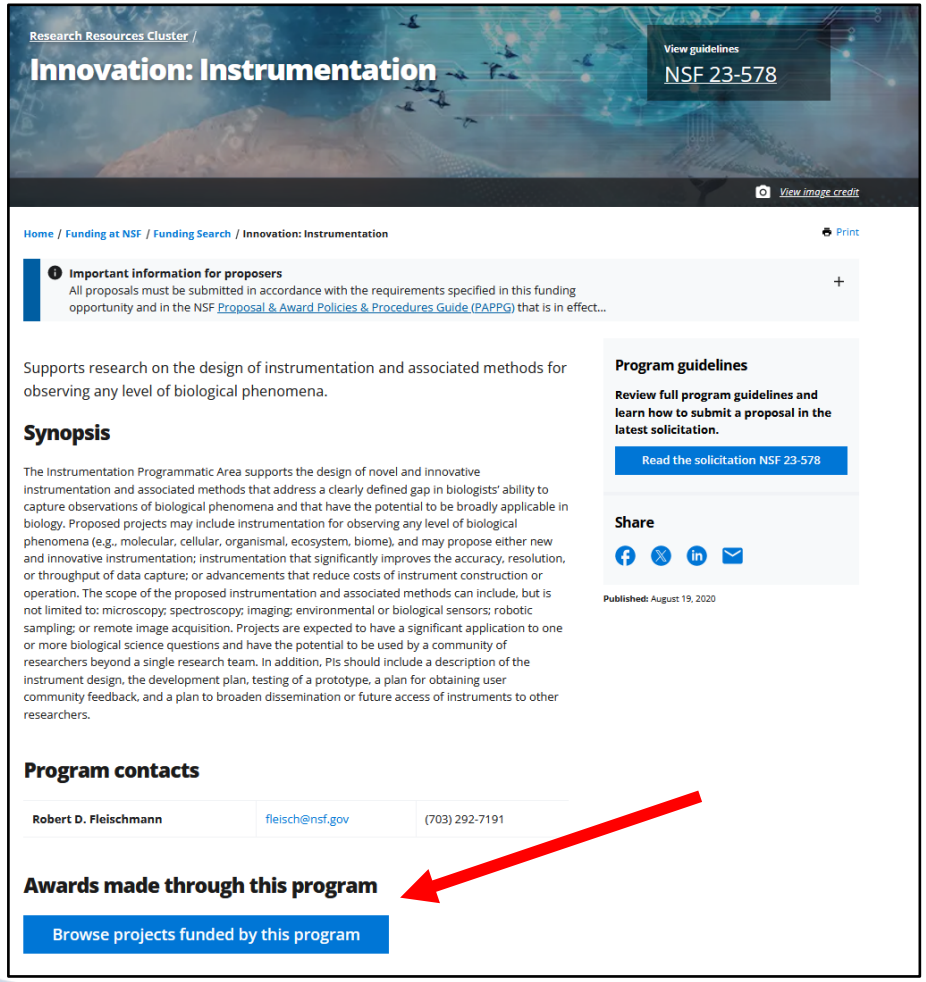
Major Research Instrumentation MRI:

Instrument Development Review Criteria

- Is there a real need for development of a new instrument?
  - Will the proposed new instrument offer benefits not available with existing instruments?
  - Is there a strong need for the new instrument in the larger user community?
  - Is this need demonstrated by a competitive metrics-driven analysis?
- Is the development plan adequate?
  - Has the appropriate technical expertise been recruited to design & construct the instrument?
  - Does the plan have a realistic & detailed schedule?
  - How is risk identified/handled/mitigated?
- Is student involvement specified for training value & for project service?
- Is the cost-benefit ratio reasonable?
- Is there a sustainability plan?

How to determine program fit and scope

Send 1-page overview of your project, ask for a meeting



Collaborative Research: Electromagnet-integrated optical microscope stage with biocompatible magnetogel for investigating mechanobiology in 2D and 3D
Award Number:2414158; Principal Investigator:Andrea Armani; Co-Principal Investigator:James Boedicker, Qiming Wang; Organization:ELLISON INSTITUTE, LLC;NSF Organization:DBI Start Date:11/01/2023; Award Amount:$575,496.00; Relevance:48.0;

MRI: Development of a fully automated, 1,000-MicroChemostat microfluidic system for parallel, independent, long-duration, machine-guided experiments
Award Number:2117782; Principal Investigator:John Wikswo; Co-Principal Investigator:John McLean, Megan Behringer, Eric Spivey; Organization:Vanderbilt University;NSF Organization:DBI Start Date:10/01/2021; Award Amount:$999,810.00; Relevance:48.0;

CAREER: Three-dimensional super-resolution light microscopy of thick, unprocessed biological samples
Award Number:2404769; Principal Investigator:Ana Doblas; Co-Principal Investigator:; Organization:University of Massachusetts, Dartmouth;NSF Organization:DBI Start Date:10/01/2023; Award Amount:$167,291.00; Relevance:48.0;

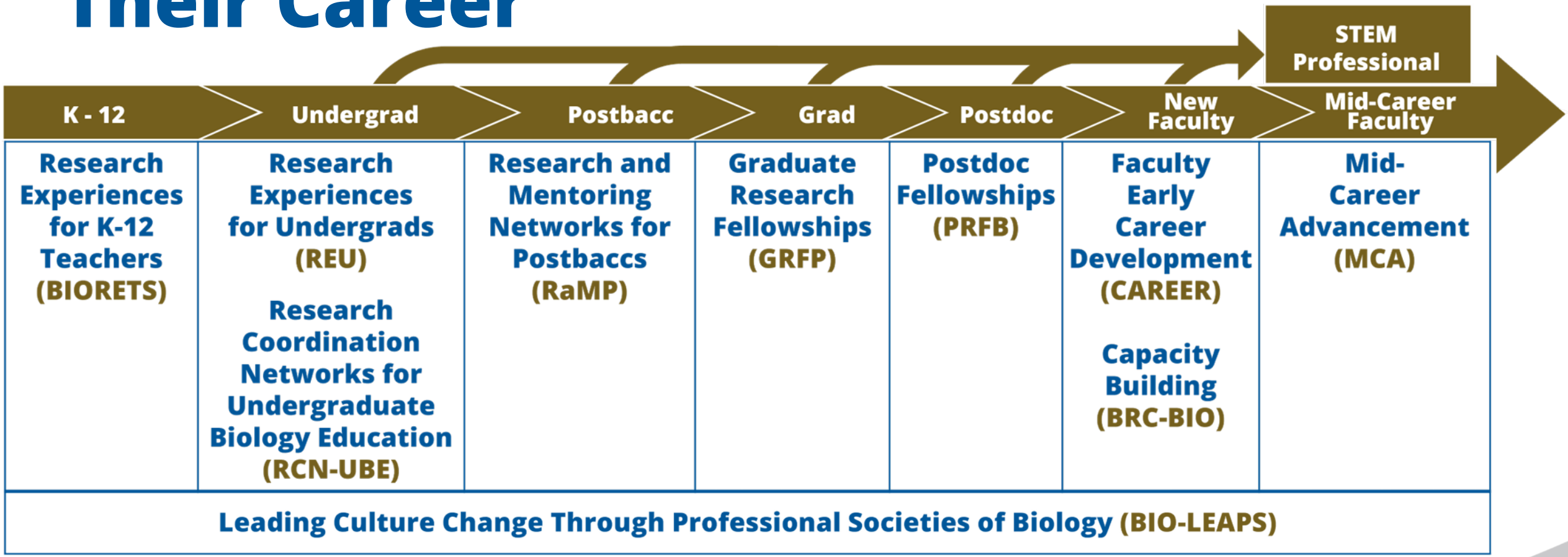
Collaborative Research: IIBR Instrumentation: A continuous metabolite sensor for lab and field studies
Award Number:2324716; Principal Investigator:Cassondra Williams; Co-Principal Investigator:Elizabeth Ferguson, Elliot Botvinick, Dane Crossley; Organization:University of California-Irvine;NSF Organization:DBI Start Date:10/01/2023; Award Amount:$696,137.00; Relevance:48.0;

CAREER: Next-generation Rhizosphere Monitoring - Non-invasive Plant Phenotyping and Health Monitoring Using the Light-piping Properties of Plant Stems
Award Number:2238365; Principal Investigator:Joshua Brake; Co-Principal Investigator:; Organization:Harvey Mudd College;NSF Organization:DBI Start Date:05/01/2023; Award Amount: $352,557.00; Relevance:48.0;

Collaborative Research: IIBR Multidisciplinary: mSAIL (Michigan Small Animal Integrated Logger): a milligram-scale, multi-modal sensor and analytics monitoring platform
Award Number:2045017; Principal Investigator:Delbert Green; Co-Principal Investigator:David Blaauw, Hun-Seok Kim; Organization:Regents of the University of Michigan - Ann Arbor;NSF Organization:DBI Start Date:04/15/2021; Award Amount:$613,589.00; Relevance:48.0;

BIO Opportunities at Specific Career Stages

BIO Supports Researchers Throughout Their Career



CAREER Faculty Early-Career Development Program

- **Who:** Tenure track faculty members at assistant professor level, or equivalent
- **What:** Designed to help junior faculty members develop activities that can **effectively integrate research and education** within the context of his/her organization.
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Application deadline is in the Summer : July 24, 2024

MCA Mid-Career Advancement

- **Who:** Scientists and engineers at the Associate Professor rank (or equivalent) with at least 3 years at that rank
    - Pilot Track in BIO and GEO extends eligibility to Full Professors (or equivalent) at Primarily Undergraduate Institutions (PUIs) only
- **What:** An opportunity to substantively enhance and advance the PI's research program and career trajectory through synergistic and mutually beneficial mentored partnerships
- **Where:** At any U.S. Institution of Higher Education or non-profit organization
- **When:** Submission window between February 1 and March 1, annually

MCA Mid-Career Advancement

Changes in 22-603

- 2-page Impact Statement, uploaded as supplementary document
  - discuss constraints on time and resources available for research, and the impact an MCA award would have on PI's productivity and advancement
- 12-page limit for Project Description
- PI and Partner must complete the Collaborative and Other Affiliations (COA) template

Note: Partner(s) may not be listed as co-PI(s) on the cover page. Rather, the one-month summer salary support for the Partner(s) should be requested in the senior personnel or consultant services budget line items of the proposal, or as a subaward to the other institution.

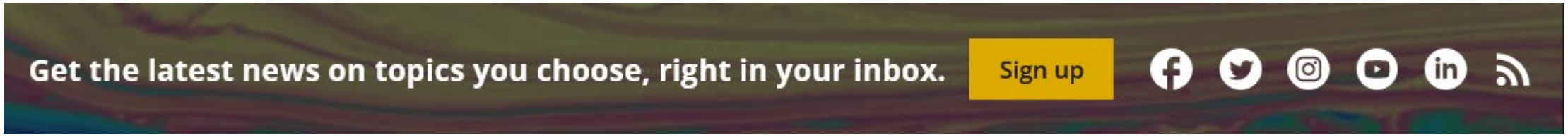
Contact: mca.info@nsf.gov

BIO Outreach and Blogs

BIO News and Updates

Sign-up for emails on new solicitations; events; due date reminders; and BIO's quarterly newsletter, including information on new priorities and solicitations, highlights from the community, and more!

Visit www.nsf.gov and scroll down until you see the Sign up and social media banner, click on the yellow box, and follow the prompts.



BIO Blogs

News, features, highlights, and more from OAD and the BIO Divisions

- BIO Buzz (OAD): https://oadblog.nsfbio.com/
- DBInfo (DBI): https://dbiblog.nsfbio.com/
- DEBrief (DEB): https://debblog.nsfbio.com/
- IOS in Focus (IOS): https://iosblog.nsfbio.com/
- MCB Blog (MCB): https://mcbblog.nsfbio.com/

BIO Virtual Office Hours (VOH)

- Informational webinar focused on:
  - New and ongoing funding opportunities
  - Topics of general interest
  - Open questions from audience to be answered live

- Days & Times by Division (occasionally rescheduled due to holidays)
  - **Division of Biological Infrastructure – 3rd Tuesday from 3-4 p.m.**
  - Division of Environmental Biology – 2nd Monday from 1-2 p.m.
  - Division of Integrative Organismal Systems – 3rd Thursday from 1-2 p.m.
  - Division of Molecular and Cellular Biosciences – 2nd Wednesday from 2-3 p.m.

NSF Needs You!

NSF Contact Information

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Questions?