

Postdoctoral Research Fellowships in Biology (PRFB)

PROGRAM SOLICITATION

NSF 19-597

REPLACES DOCUMENT(S):

NSF 15-501



National Science Foundation

Directorate for Biological Sciences

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

November 19, 2019

IMPORTANT INFORMATION AND REVISION NOTES

A new research focus, Competitive Area 4, Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes, has been added. An eligibility criterion has been revised. It is anticipated that this will be the final year for Competitive Area 2, Interdisciplinary Research Using Biological Collections. In future years, it is expected that research using biological collections could be proposed under other Competitive Areas.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPP) ([NSF 19-1](#)), which is effective for proposals submitted, or due, on or after February 25, 2019.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Postdoctoral Research Fellowships in Biology (PRFB)

Synopsis of Program:

The Directorate for Biological Sciences (BIO) awards Postdoctoral Research Fellowships in Biology (PRFB) to recent recipients of the doctoral degree for research and training in *selected* areas supported by BIO and with special goals for human resource development in biology. The fellowships encourage independence at an early stage of the research career to permit Fellows to pursue their research and training goals in the most appropriate research locations regardless of the availability of funding for the Fellows at that site. For applications under this solicitation, these areas are **(1) Broadening Participation of Groups Underrepresented in Biology, (2) Interdisciplinary Research Using Biological Collections, (3) National Plant Genome Initiative (NPGI) Postdoctoral Research Fellowships and (4) Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes.**

The fellowships are also designed to provide active mentoring of the Fellows by the sponsoring scientists who will benefit from having these talented young scientists in their research groups. The research and training plan of each fellowship must address important scientific questions within the scope of BIO and the specific guidelines in this fellowship program solicitation. Because the fellowships are offered to postdoctoral scientists only early in their careers, NSF encourages doctoral students to discuss the availability of these postdoctoral fellowships with their doctoral mentors and potential postdoctoral sponsors early in their doctoral programs to take advantage of this funding opportunity. Fellowships are awards to individuals, not institutions, and are administered by the Fellows.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Amanda A. Simcox (Areas 1, 2 & 4), telephone: (703) 292-2532, email: asimcox@nsf.gov

- John Barthell (Areas 1, 2 & 4), telephone: (703) 292-2618, email: jbarthel@nsf.gov
- Diane J. Okamuro (Area 3), telephone: (703) 292-8420, email: dokamuro@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Fellowship

Estimated Number of Awards: 65

fellowships per year; the number of awards in each Competitive Area is contingent upon availability of funds.

Anticipated Funding Amount: \$10,000,000 to \$12,000,000

Approximately \$6-8 million for Competitive Areas 1, 2 and 4; and up to \$4 million for Competitive Area 3, from the Plant Genome Research Program (PGRP) in the Division of Integrative Organismal Systems (IOS). Funding is contingent upon availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Unaffiliated Individuals: Scientists, engineers or educators in the U.S. who are U.S. citizens.

Who May Serve as PI:

The PRFB awards are intended primarily for graduate students who are seeking independent support for their first postdoctoral position, or fellows early in their postdoctoral careers. In Competitive Areas 1, 2 and 4, applicants should not have served in any position that requires the doctoral degree for more than 9 full time months prior to the deadline. In Competitive Area 3, applicants should not have served in any position that requires the doctoral degree for more than 12 full time months prior to the deadline.

To be eligible for any Competitive Area, you must

- be a U.S. citizen (or national) or a U.S. permanent resident, *i.e.*, have a "green card," when applying;
- present a research plan that falls within the purview of BIO and the focus for one of the selected areas, as described in this solicitation;
- earn the doctoral degree in an appropriate field prior to beginning the fellowship;
- select sponsoring scientists, departments, and institutions that offer a significant opportunity to broaden your research focus and training; and
- not have submitted the same research to another NSF postdoctoral fellowship program.

Limit on Number of Proposals per Organization:

Only individuals may apply. There is no limit on the number of applicants that an institution may host.

Limit on Number of Proposals per PI or Co-PI: 1

Applicants may submit only one fellowship application to BIO per fiscal year and may apply in no more than 2 successive years for all Postdoctoral Fellowships in Biology.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard *NSF Proposal and Award Policies and Procedures Guide (PAPPG)* proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:**
Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable

- **Other Budgetary Limitations:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

November 19, 2019

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

BIO offers Postdoctoral Research Fellowships in Biology to provide opportunities for scientists early in their careers who are ready to assume independence in their research efforts and to obtain training beyond their graduate education in preparation for scientific careers, to gain research experience under the sponsorship of established scientists, and to broaden their scientific horizons. Fellowships are further designed to assist new scientists to direct their research efforts beyond traditional disciplinary lines and to avail themselves of unique research resources, sites, and facilities, including international locations. Fellows must affiliate with appropriate research institutions and are expected to devote themselves full time to the fellowship activities for the duration of the fellowship. The fellowships have both research and training goals.

Currently BIO offers Postdoctoral Research Fellowships in Biology in the following four areas:

Competitive Area 1. Broadening Participation of Groups Underrepresented in Biology

These fellowships have been offered since FY 1990, originally as the NSF Minority Postdoctoral Research Fellowships, to increase the participation of underrepresented groups in biology. The program supports a wide range of biological research and training across the

full range of BIO's research programs. International training may be included in the research plan provided that it is relevant to the goals of the research.

Competitive Area 2. Interdisciplinary Research Using Biological Collections

Biological research collections represent the documented scientific history of life on Earth, and the U.S. alone curates over a billion specimens ranging from bacteria to plants, insects and vertebrates, as well as fossils. These specimens are maintained as historical collections in museums and as living collections in other repositories, such as herbaria and stock centers. Through this Competitive Area, BIO seeks transformative use of biological collections to address grand challenges in biology. International training may be included in the research plan provided that it is relevant to the goals of the research.

Competitive Area 3. National Plant Genome Initiative (NPGI) Postdoctoral Research Fellowships

The NPGI fellowships allow the recipients to focus their studies in plant genomics with an emphasis on quantitative genetics, modern breeding approaches, and bioinformatics. The research and training plan of each fellowship must address important scientific questions within the scope of the goals of the NPGI and the specific guidelines in this Solicitation. Opportunities to participate in research in USDA-ARS laboratories and the DOE's Joint Genome Institute are possible as part of the training activities for the postdoctoral fellows. International training may be included in the research plan provided that it is relevant to the goals of the NPGI and within the scope of this Program.

Competitive Area 4. Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes

Through this Competitive Area, BIO aims to stimulate creative integration of diverse subdisciplines of biology using combinations of observational, experimental, theoretical, and computational approaches to discover underlying principles operating across hierarchical levels of life, from biomolecules to organisms to ecosystems. Research activities under this Rules of Life Competitive Area should lead to new understanding of how higher-order structures and functions of biological systems result from the interactions of heterogeneous biological components, as shaped by the environment and evolutionary processes, thus furthering predictive capability of how key properties and mechanisms of living systems emerge from the interactions of genomes, environments, and phenotypes.

II. PROGRAM DESCRIPTION

Fellowship Competitive Area 1: Broadening Participation of Groups Underrepresented in Biology

Through this Competitive Area, BIO seeks to increase the diversity of scientists at the postdoctoral level in biology, and thereby contribute to the future vitality of the Nation's scientific enterprise. Groups that are significantly underrepresented in biology in the U.S. include Native Americans, including Alaskan Natives and Native Pacific Islanders, African Americans, and Hispanics. Individuals with disabilities are also underrepresented. The goal of the program is to prepare minority biologists and others who share NSF's diversity goals for positions of scientific leadership in academia, industry, and government. The research and training plan in these applications must fall within the purview of BIO and explain how the fellowship award will broaden or effectively encourage broadening the participation of underrepresented minorities in biology supported by BIO.

Fellowship Competitive Area 2: Interdisciplinary Research Using Biological Collections

New technologies, including NSF-led programs in digitization, are reinvigorating collections-based research in the U.S. Collections data are becoming searchable whether they are physical specimens, text, images, sounds, or data tables, through accessible online integrated databases. Despite clear progress in improving access, a considerable amount of information on curated specimens remains unexplored, awaiting new analysis, instrumentation, and methods to study their structure and composition for use in answering contemporary questions about basic biology. Using collections as the source for interdisciplinary bio-inspired approaches and designs has multilateral benefits: 1) it benefits biology by presenting new opportunities to advance understanding of biological processes and systems and inspires new discoveries in areas that are understudied, and 2) it aids other disciplines to which it is applied by providing new and potentially transformative approaches to challenging questions that originate in biological systems.

The proposed research and training plan for applications to this Competitive Area **must** include substantive and significant use of specimens and/or data from existing, archived biological research collections and their associated collection databases. The proposal must describe access to the collection(s) and/or data by providing letters as Supplementary Documentation. Successful applicants will propose interdisciplinary research and training plans that use collections in potentially transformative approaches to address biological questions that extend to physical, mathematical, engineering or social sciences.

Fellowship Competitive Area 3: National Plant Genome Initiative (NPGI) Postdoctoral Research Fellowships

Plant improvement is undergoing a revolution through the application of new tools for genotyping and phenotyping, and in the quantitative theory used for selection. In addition, the flood of data being generated requires new computational tools to provide an effective framework for basic plant biology research and plant improvement. The purpose of these fellowships is to provide postdoctoral training opportunities that target interdisciplinary research in plant improvement and associated sciences such as physiology and pathology, quantitative genetics, and computational biology. Applicants with strong backgrounds in a single disciplinary area may consider expanding their expertise with research in associated fields. For example, a Ph.D. in plant breeding may consider a fellowship in statistical genetics with a focus on application to plant improvement. Plant breeding is increasingly interdisciplinary and requires sophisticated modeling and experimental techniques; therefore, new connections are needed between biology and the mathematical/computational/statistical sciences.

Successful applicants will propose research and training plans that are significantly different from their graduate research and training and which address important scientific questions within the scope of the goals of the NPGI (https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/NSTC/npgi_five-year_plan_5-2014.pdf) and the specific guidelines in this Solicitation. The overall goal of the NPGI is to develop a basic knowledge of the structures and functions of plant

genomes and translate this knowledge to a comprehensive understanding of all aspects of economically important plants and plant processes of potential economic value. By bridging basic research and plant performance in the field, the NPGI aims to accelerate basic discovery and innovation in economically important plants and enable enhanced management of agriculture, natural resources, and the environment to meet societal needs.

As part of Competitive Area 3, applicants are encouraged to consider sponsors located at the DOE Joint Genome Institute (JGI) and USDA-ARS laboratories. Fellows undertaking part or all of their research activities at the JGI will have the opportunity to contribute to improvements in genome assembly, annotation, and community access (through web-based activities such as Phytozome, Gramene, etc.) for completed, ongoing or planned plant genome projects. The list of such projects is available at <http://jgi.doe.gov/our-science/science-programs/plant-genomics/>. Interested candidates must identify a specific project and address how their scientific expertise and career development would benefit from this interaction with the JGI.

Fellowship Competitive Area 4: Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes

Research activities under this Rules of Life Competitive Area should lead to new understanding of how higher-order structures and functions of biological systems result from the interactions of heterogeneous biological components, as shaped by the environment and evolutionary processes. Understanding how these key properties and mechanisms of living systems emerge from the interactions of genomes, environments, and phenotypes is also expected to produce theories or models with predictive capability.

Hypothesis driven research as well as advanced data-science techniques for integrating heterogeneous data are appropriate. Proposals submitted to this track **must** use combinations of computational, observational, experimental, and conceptual approaches to address the mechanistic relationships between genomes and phenomes in an environmental context. The research **must** also span hierarchical levels of analysis, across part or all of the continuum from biomolecules to organisms to ecosystems. Proposals **should** translate observational and experimental data sets into novel models and/or theories to address phenomena across multiple levels of biological organization.

It is likely that successful applicants will need to choose a research environment for their fellowship that includes expertise in multiple disciplines. Therefore, candidates for this track are encouraged to describe in the project description how the attributes of the proposed environment and/or other collaborating investigators, including potential co-mentor(s) if applicable, will contribute to the specific goals of the proposed project and training.

General description of BIO Postdoctoral Fellowships

A. Appropriateness for BIO and Program Priorities

For Competitive Areas 1 and 2, a research and training plan with a focus within the scope of any of the core programs in BIO is eligible for support. Further restrictions apply for Competitive Areas 3 and 4 (see details in the descriptions of those Competitive Areas). Be aware: "Research with disease-related goals, including work on the etiology, diagnosis or treatment of physical or mental disease, abnormality, or malfunction in human beings or animals, is normally not supported. Animal models of such conditions or the development or testing of drugs or other procedures for their treatment also are not eligible for support." See *NSF Proposal and Award Policies and Procedures Guide (PAPPG)*. While it is expected that research of fundamental biological significance may often have broader impacts to medicine and human health, applications determined to have a clear biomedical focus will be returned without review. **If your application mentions human disease**, you should discuss its appropriateness with one of the listed Program Officers. Priority is given to research areas where BIO plays a unique or special role among NSF programs and total Federal funding. If your research is in an area of biology not primarily funded by BIO or if you are uncertain, you are strongly encouraged to contact one of the BIO Program Officers to discuss the appropriateness of the research and training.

B. Location of Work

Research and training supported by these fellowships may be conducted at any appropriate U.S. or international host institution. Appropriate institutions include colleges and universities, private nonprofit institutes and museums, and government installations and laboratories.

Because the objectives of the fellowships include broadening the perspectives and experiences of the Fellows and promoting interdisciplinary research careers, careful consideration should be given to the selection of the sponsoring scientists and host institutions. Priority will be given to applicants who propose new locations for the fellowship. Applicants who propose remaining in their current locations or positions must justify why a new location or position is not being proposed. For Competitive Area 3, applicants planning to stay in their current positions must also articulate how the new training planned under the fellowship would meet the goals of the National Plant Genome Initiative.

BIO encourages Fellows to gain international experience by selecting international hosts for at least part of the tenure of the fellowship when applying to all Competitive Areas. For example, in addition to non-US academic institutions, NPGI (Competitive Area 3) applicants may consider the Consultative Group on International Agricultural Research (CGIAR) Centers as potential hosts for international activities. See <https://www.cgiar.org/> for list of locations. Applicants to all Competitive Areas may consider conducting research in Europe with colleagues supported through EU-funded European Research Council (ERC) grants. Dear Colleague Letter *NSF 19-062* provides details on how to apply and requirements.

Applicants to Competitive Areas 1, 2 and 4, who plan to spend more than one year of the fellowship in a sponsoring laboratory overseas may request a 3-year fellowship rather than the 2-year tenure that is typical for these areas. Competitive Area 3 fellowships all have a 3-year tenure, regardless of whether an international component is proposed. In all cases, both the international and U.S. locations must be included in the sponsoring scientist statement in the application.

C. The Sponsoring Scientist(s)

The Fellow must affiliate with a host institution(s) at all times during the entire tenure of the fellowship and select a sponsoring scientist(s) who will provide mentoring and guidance for both the research and training proposed by the applicant. The applicant is responsible for making prior arrangements with the host institution and sponsoring scientist(s). Regardless of the

number of sponsors or locations, the fellowship application requires a single sponsoring scientist statement. When more than one sponsor is proposed, one must be named lead sponsor and information from all sponsors must be integrated into a single statement. Likewise, if more than one site is proposed, the sponsoring scientist statement must integrate all sponsors and locations in a single statement.

An important basis for judging the suitability of the host institution is the degree to which the sponsoring scientist statement describes and offers a research environment and mentoring plan that support the fellowship activities.

If a fellowship is offered, the applicant may be requested to provide documentation from the host institution that the terms and conditions of the fellowship are acceptable and that the Fellow will be provided adequate mentoring, space, basic services, needed resources, and supplies. Once an application is submitted, any changes in location or sponsorship for the fellowship must be approved in advance by BIO.

III. AWARD INFORMATION

Estimated program budget and number of awards are subject to the availability of funds.

A. Duration and Tenure

Awards are made in the Spring following the deadline, with start dates on the first of the month from June 1 through to March 1. Interruptions in tenure or extensions without additional cost to NSF are permitted only in special circumstances and require NSF approval. Fellowships are not renewable.

Competitive Areas 1, 2 and 4.

The fellowship tenure is normally 24 continuous months except when the Fellow spends a year or more abroad. In this case, the original application may request a 36-month tenure.

Competitive Area 3.

The fellowship tenure for Competitive Area 3 is 36 continuous months.

B. Stipend and Allowances

For the basic fellowship, the total fellowship amount is \$69,000 per year and consists of two types of payments: a stipend and a research and training allowance. A monthly stipend of \$4,500 is paid directly to the Fellow. The fellowship allowance of \$15,000 per year is provided and spent at the Fellow's discretion, except foreign travel, which requires prior NSF approval. This allowance is intended to cover research- and training-related costs and fringe benefits. Allowable research and training costs include travel, such as short-term visits to other institutions or laboratories, field work, and attendance at scientific meetings, training, special equipment, IT equipment and software, supplies, publication costs, access fees for databases and other research-related expenses. The Fellow should keep records to document expenditures. Allowable costs for fringe benefits include individual or family health insurance (any combination of medical, vision, and/or dental) whether purchased as a group or individual plan, disability insurance, retirement savings, dependent care, and moving expenses. All payments are made directly to the Fellow as an electronic funds transfer into a personal account at a U.S. financial institution.

Within the fellowship period, one month per year of fellowship duration may be used for paid leave, including parental or family leave. The paid leave cannot be used to increase the level of NSF support beyond the duration of the fellowship. NSF enables career-life balance through a variety of mechanisms. For more information, please see <https://www.nsf.gov/career-life-balance/>.

The fellowship amount can be increased to include a Facilitation Award for Scientists and Engineers with Disabilities (FASSED). When requesting FASSED funding, applicants should contact the Postdoctoral Research Fellowships in Biology program prior to applying.

Fellowships may be supplemented by host scientists and host institutions with non-Federal funds but only if the additional funds do not carry additional responsibilities beyond the research and training supported by the fellowship.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Unaffiliated Individuals: Scientists, engineers or educators in the U.S. who are U.S. citizens.

Who May Serve as PI:

The PRFB awards are intended primarily for graduate students who are seeking independent support for their first postdoctoral position, or fellows early in their postdoctoral careers. In Competitive Areas 1, 2 and 4, applicants should not have served in any position that requires the doctoral degree for more than 9 full time months prior to the deadline. In Competitive Area 3, applicants should not have served in any position that requires the doctoral degree

for more than 12 full time months prior to the deadline.

To be eligible for any Competitive Area, you must

- be a U.S. citizen (or national) or a U.S. permanent resident, *i.e.*, have a "green card," when applying;
- present a research plan that falls within the purview of BIO and the focus for one of the selected areas, as described in this solicitation;
- earn the doctoral degree in an appropriate field prior to beginning the fellowship;
- select sponsoring scientists, departments, and institutions that offer a significant opportunity to broaden your research focus and training; and
- not have submitted the same research to another NSF postdoctoral fellowship program.

Limit on Number of Proposals per Organization:

Only individuals may apply. There is no limit on the number of applicants that an institution may host.

Limit on Number of Proposals per PI or Co-PI: 1

Applicants may submit only one fellowship application to BIO per fiscal year and may apply in no more than 2 successive years for all Postdoctoral Fellowships in Biology.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Preparation Instructions that Deviate from the PAPPG

Include all the requested information and documentation and include **only** what is specifically requested. Page limits include pictures, figures, tables, graphics, etc. Proposals that do not conform to these requirements and all page limitations will be returned without review. You will not be given a chance to correct, shorten, or resubmit the application after the deadline. Proposals must be submitted electronically via the NSF FastLane system. Only complete and timely applications will be accepted; non-compliant applications will be returned without review as will those that are incomplete or late. A complete FastLane submitted proposal requires materials from you (the applicant), a statement and CV from your sponsoring scientist(s), and 2 reference letters (one from the doctoral thesis advisor).

Preparing your fellowship application is different in several ways from preparing a research proposal:

- Do not submit your proposal through a sponsored projects office at your home or host institution; you are submitting the proposal as an individual. You must first register as an individual researcher before you or your references can gain access to the application and reference procedures. To use FastLane, go to the NSF Web site <https://www.nsf.gov/> and select "FastLane" or directly to the FastLane home page <https://www.fastlane.nsf.gov/>. Click on the *Postdoctoral Fellowships and Other Programs* tab. Click on "Applicant", then select Postdoctoral Research Fellowships in Biology. Complete step-by-step instructions on "How to apply" may be found on the program webpage.
- The information needed from the sponsoring scientist(s) is found on the FastLane homepage after answering "Sponsoring Scientist" to the "Who are you?" question. The sponsoring scientist statement and CV(s) must be uploaded into the application.
- The information needed from the reference writers is found on the FastLane homepage after answering "Letter of Reference Writer" to the "Who are you?" question. Your references enter their letters directly into FastLane.

A complete postdoctoral fellowship application consists of the following (Note: *The entire application, with the exception of the letters of reference must be submitted by the fellowship applicant in FastLane*):

1. NSF Cover Page;
2. FastLane application form (this form is unique to fellowships and can only be accessed in FastLane by following the directions as described herein. Applications in which the form is incomplete will be returned without review. Write in None or N/A if you have no information to provide for some of the items);
3. Project Summary (Abstract of all fellowship activities) (limited to one page). The Project Summary must include an overview and separate statements on intellectual merit and broader impacts. The fellowship consists of research, training goals for the Fellow, and career development activities; therefore, all must be presented in the overview. The research plans and goals should be described in the section on **intellectual merit**; training, career development, and educational or public outreach should be described in the section on **broader impacts**. See Section VI. A. below for guidance from the National Science Board on additional broader impacts which you may wish to include. If the project summary fails to clearly address in separate statements the intellectual merit and broader impacts of the fellowship, the application will be returned without review. If you are applying to Competitive Area 2 you must identify the collection(s) to be used in the research and training.
4. Project Description (Research and Training Plan) (limited to 6 pages, including all figures, tables, etc.) including a timetable

with yearly goals with benchmarks for major anticipated outcomes and a description of future research and career directions. You must identify and present goals for both the research and training components of the fellowship. You must also address the broader impacts of the fellowship beyond your own training in this section; it is not adequate to address broader impacts only in the project summary. Your application will be reviewed by an interdisciplinary panel and the research portion should not contain jargon and acronyms that are not understandable to a wide range of scientists. Do not cut and paste the project summary into the project description. Space is very limited and repeating text robs you of valuable space to present your ideas and fully develop them.

5. References Cited: bibliography for Project Description (no page limit);
6. Biographical Sketch: Applicant's Curriculum Vitae (CV) limited to 2 pages (list publications and abstracts separately if you have both to report);
7. Current and Pending Support: Include current and planned applications or proposals to other fellowship programs.
8. Supplementary Documentation consisting of:
 - An abstract of your dissertation research (limited to one page);
 - The sponsoring scientist(s) statement (limited to 3 pages) and 2-page CV(s);
 - For Competitive Area 2, documentation is required from the collection director that your proposed research meets all policies and requirements of the collection (this document, called a letter of access in the Additional Review Criteria, must address access and is not to be an endorsement of your application); and
 - A Data Management plan. *All* applications *must* include a supplementary document of no more than 2 pages labeled "Data Management Plan" that describes plans for data management and sharing of the products of research, or asserts the absence of the need for such plans.
9. Two letters of reference submitted directly in FastLane by the reference writers. One should be your thesis advisor. Do **not** use your sponsoring scientist as a reference.

Guidance on the Project Description (Research and Training Plan):

The research and training plan present the research that you will conduct and the training that you will receive during the fellowship period and how these relate to your career goals. Include in the research and training plan: 1) a very **brief** and informative introduction or background section; 2) a statement of research objectives, methods, and significance; 3) training objectives and plan for achieving them (these may include scientific as well as other career preparation activities); 4) an explanation of how the fellowship activities will enhance your career development and future research directions as well as describing how this research differs from your dissertation research; 5) a justification of the choice of sponsoring scientist(s) and host institution(s); and 6) a timetable with yearly goals with benchmarks for major anticipated outcomes. As with all NSF proposals, broader impacts must also be addressed in this section.

Some applications may require other documentation before the final decision can be made, e.g., animal care and use, human subjects, government permits, letters of collaboration, and commitments from private sources. Their existence should be noted in the research and training plan, but they should **not** be included in the application unless they pertain to use of collections. NSF may request them later.

Guidance on the Sponsoring Scientist(s) Statement:

The sponsoring scientist(s) statement is meant to show how the proposed host(s) and host institution(s) provide a strong environment for the Fellow's proposed research and training plan and form the basis for a future independent research career. Therefore, it should include a specific mentoring plan, a description of how the Fellow's independence will be nurtured, including, as appropriate to the career goals, how the project could continue as an independent research focus for the Fellow in their next position. Regardless of the number of sponsors, one integrated statement must be developed and submitted. If the Fellow plans to teach as part of career development activities, the Fellow is limited to teaching in a course taught by the sponsoring scientist(s) or as part of a course directly related to the Fellow's doctoral or fellowship research project. The sponsoring scientist(s) statement must detail the mentoring that the Fellow will receive on teaching if applicable. Sponsors are not expected to provide all the mentoring themselves and may call on all resources available on campus or through other organizations, e.g., professional societies, postdoctoral offices, etc.

Reminder: A complete sponsoring scientist statement consists of two parts; a CV of no more than two pages for each sponsor and a single discussion (no more than 3 pages) of the following items:

1. A brief description of the research projects in the host research group(s), including a statement of current and pending research support, both private and public, for each sponsor. If any sponsor has submitted similar research for funding, the degree of overlap must be addressed.
2. A description of how the research and training plan for the applicant would fit into and complement ongoing research of the sponsor(s) as well as an indication of the personnel with whom the Fellow would work.
3. An explanation of how the sponsor(s) will determine what mentoring the applicant needs in research, teaching, and career development skills and how these would be translated into a specific plan that fosters the development of the applicant's future independent research career.
4. A description of the role the sponsor(s) will play in the proposed research and training and the other resources that will be available to the Fellow to complete his or her training plan during the fellowship.
5. A description of any limitations that may be placed on the Fellow for continuing the research project in an independent capacity following the fellowship.

The sponsoring scientist statement should be uploaded into your application as a "Supplementary Document" in FastLane.

Guidance on the Reference Letters

Your application must also include the two references as listed on your application form. One should be your thesis advisor. Do **not** use your sponsoring scientist as a reference. Your references will need your FastLane-assigned temporary proposal number and a password that you assign. FastLane permits you to send them an email with this information or you can provide it to them directly. They must change the password the first time they login to the reference module. They complete a reference form in FastLane, upload a recommendation letter, and then submit the reference.

Submission Check List

This checklist is provided to aid in the preparation of the proposal, the burden to ensure that the proposal is complete and meets all of

the solicitation requirements remains with the applicant.

Description	Competitive Areas			
	1	2	3	4
FastLane Application Form	X	X	X	X
Project Summary with an overview and separate sections for both intellectual merit and broader impacts (1 page)	X	X	X	X
Project Description (6 pages)	X	X	X	X
References	X	X	X	X
Biographical sketch (2 pages)	X	X	X	X
Applicant's Current and Pending Support	X	X	X	X
Abstract of Dissertation Research (1 page)	X	X	X	X
Sponsoring Scientist statement (3 pages max)	X	X	X	X
Sponsoring Scientist Biographical Sketch (2 pages)	X	X	X	X
Data Management Plan (2 pages)	X	X	X	X
Documentation on access to proposed collection(s)		X		

Proposers are reminded to identify the NSF publication number (located on the first page of this document) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

The award amount is set for postdoctoral fellowships based on the duration of the award. FastLane generates the budget; applicants do not need to enter any budget information. The research and training plan should make clear the requested duration.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

November 19, 2019

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see PAPPG Chapter II.C.1.d for a listing of the certifications). The AOR must provide the required electronic certifications at the time of proposal submission. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. Merit Review Principles and Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_3.jsp#IIA2b.

Additional Solicitation Specific Review Criteria

Applicants are evaluated on their ability and accomplishments as evidenced by the submitted CV. The research plan is evaluated on scientific merit, feasibility, potential to generate new biological knowledge, and for evidence of the applicant's strong independent scientific thinking and initiative. The training plan is evaluated for how distinct the proposed research is from the dissertation, the impact on the career development of the applicant, and the sponsor's expertise related to the proposed research and in mentoring trainees. Other important evaluative factors are the suitability of the host institution(s), including colleagues and facilities.

Additional evaluation criteria:

For **Competitive Area 1, Broadening Participation of Groups Underrepresented in Biology**, reviewers will assess the innovation and feasibility of the plan to broaden the participation of an identified group underrepresented in biology.

For **Competitive Area 2, Interdisciplinary Research Using Biological Collections**, reviewers will consider how integral, appropriate, and significant the selected collection(s) is to the proposed research and training, as well as its availability (documented in the letters of access).

For **Competitive Area 3, National Plant Genome Initiative Postdoctoral Research Fellowships**, applicants may first be screened by NSF Program Directors for the relevance of the proposed research and training to the goals of the National Plant Genome Initiative and this Postdoctoral Fellowship opportunity. **Project summaries must clearly describe the relevance of the proposed research and training to the specific goals of the National Plant Genome Initiative as well as this Postdoctoral Fellowship opportunity.** Applications lacking this information or where the relevance is insufficient will be returned without review as "**not responsive to the program solicitation**". Reviewers will consider how the proposed activities address the research goals of the NPGI and PGRF, the goal of the NPGI PRFB in providing training opportunities that target interdisciplinary research in one or more areas related to plant improvement, genomics, physiology, pathology, quantitative genetics, or computational biology, and evidence of a desire to train the next generation of plant breeders.

For **Competitive Area 4, Integrative Research Investigating the Rules of Life Governing Interactions Between Genomes, Environment and Phenotypes**, reviewers will consider the use of multiple approaches, the scales of biological organization spanned by the research, and the theoretical and general predictive value of the research.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex

proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg.

Special Award Conditions:

The fellowship award is made to the individual, not the institution and payments are made directly to the Fellow. Awards cannot be extended without prior NSF approval. Pre-award costs are not permitted.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through [Research.gov](https://www.research.gov), for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via [Research.gov](https://www.research.gov) constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using [Research.gov](https://www.research.gov). This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF

Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Additional Reporting Requirements:

Applicants must file starting and termination certificates in addition to annual and final technical reports.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Amanda A. Simcox (Areas 1, 2 & 4), telephone: (703) 292-2532, email: asimcox@nsf.gov
- John Barthel (Areas 1, 2 & 4), telephone: (703) 292-2618, email: jbarthel@nsf.gov
- Diane J. Okamuro (Area 3), telephone: (703) 292-8420, email: dokamuro@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
FastLane Help Desk e-mail: fastlane@nsf.gov.
Research.gov Help Desk e-mail: rgov@nsf.gov

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <https://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding

grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0023. Public reporting burden for this collection of information is estimated to average 12 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314

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