Ecology of Infectious Diseases (EID)

PROGRAM SOLICITATION
NSF 10-616

REPLACES DOCUMENT(S):
NSF 08-601

National Science Foundation

Directorate for Biological Sciences

Directorate for Geosciences

Directorate for Social, Behavioral & Economic Sciences

National Institutes of Health

John E. Fogarty International Center

U.K. Economic and Social Research Council

U.K. Biotechnology and Biological Sciences Research Council

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

December 15, 2010

IMPORTANT INFORMATION AND REVISION NOTES

This revision re-initiates and expands the US-UK Collaborative Projects activity by adding participation of the UK Biotechnology and Biological Sciences Research Council and lifting the funding cap on UK budgets. As a result the range of UK scientists eligible to participate in these projects has been expanded to anyone who can participate in a project that fits within the remit of the ESRC or BBSRC.

Research Coordination Network proposals may now be submitted to the EID program.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes guidelines implementing the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this requirement).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Ecology of Infectious Diseases (EID)

Synopsis of Program:

The Ecology of Infectious Diseases program supports the development of predictive models and the discovery of principles governing the transmission dynamics of infectious disease agents. To that end, research proposals should focus on understanding the ecological, evolutionary and socio-ecological determinants of transmission by vectors or abiotic agents; the population dynamics and genetics of reservoir species; the transmission to humans, other non-human animals or plants; or the cultural, social, behavioral, and economic dimensions of disease communication. Research may be on zoonotic, vector-borne or enteric diseases of either terrestrial, freshwater, or

marine systems and organisms, including diseases of non-human animals and plants, at any scale from specific pathogens to inclusive environmental systems. Diseases affecting humans must have an environmental transmission component; research on solely human-to-human transmitted disease systems are not eligible for EID support. Proposals for research on disease systems of public health concern to developing countries are strongly encouraged, as are disease systems of agricultural concern. Investigators are encouraged to include links to the public health research community, including for example, participation of epidemiologists, physicians, veterinarians, social scientists, medical entomologists, pathologists, virologists, or parasitologists.

Cognizant Program Officer(s):

- Samuel Scheiner, Program Director, telephone: (703) 292-7175, email: sscheine@nsf.gov
- Joshua Rosenthal, Program Director, FIC/NIH, telephone: (301) 496-1653, fax: (301) 402-0779, email: joshua_rosenthal@nih.gov
- Phillip R. Taylor, Section Head, telephone: (703) 292-7715, email: prtaylor@nsf.gov
- Deborah Winslow, Program Director, SBE/NSF, telephone: (703) 292-7315, email: dwinslow@nsf.gov
- Teresa Wysocka, Research Development Manager, ESRC, telephone: 44 1793-442859, email: Teresa.wysocka@esrc.ac.uk
- Sadhana Sharma, Strategy and Policy Manager-Animal Health, BBSRC, telephone: 44 1793-412099, email: sadhana.sharma@bbsrc.ac.uk

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

- 47.050 --- Geosciences
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 93.989 --- John E. Fogarty International Center

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 8

Anticipated Funding Amount: $10,000,000 in FY 2011, pending the availability of funds. That amount includes approximately $7M from NSF for new standard or continuing awards and approximately $3M from NIH for new awards. The expected funding from the U.K. Research Councils for the UK component of the US-UK Collaborative Projects will be a maximum of £1,800,000.

Eligibility Information

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

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

  December 15, 2010

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations 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

The past twenty years has seen a dramatic increase in awareness of the need to understand ecological and evolutionary drivers of disease emergence and transmission dynamics. While our knowledge has increased about particular systems and the basic principles of simple systems, our understanding of complex systems is still weak and translation of those principles into public health and management tools is inadequate. System complexity includes such factors as multiple interacting host, pathogen or vector species; interactions among pathogenic and non-pathogenic microbes; interactions between biological and sociological factors; affects of spatial and temporal structure; and evolutionary dynamics.

The emergence and the reemergence of numerous infectious diseases around the world have coincided with unprecedented rates of change in the structure and diversity of the environment and human social and economic systems. Nearly all of the world's terrestrial and aquatic (freshwater and marine) ecosystems have undergone dramatic changes due to a variety of human activities such as habitat transformation, human movement, urbanization, rapid long-distance transport, species invasions, deliberate introduction of infectious diseases for biological control, bushmeat and other wildlife trade, chemical waste contamination, and climate change. The coincidence of broad scale environmental changes, the expansion of human social and economic networks, and the emergence of infectious diseases may point to underlying predictable ecological relationships.

For example, habitat fragmentation may reduce populations of mammalian predators of animals that are natural reservoirs of disease agents, resulting in increased transmission to humans. Similarly, runoff from urban and rural sewage systems may carry pathogens that proliferate in shellfish and fish and eventually infect humans via consumption as food. Expansion of logging roads in formerly inaccessible forests has increased access to non-human primates as food, accelerating the rates at which primate diseases reach human populations. Economic restructuring in developing nations has diverted funding from public health infrastructure and sanitation programs, allowing formerly controlled diseases to re-establish themselves. Medical and public health practices, such as the use of antimicrobial drugs and nonpharmaceutical interventions, the availability of diagnostic tools, and access to health care, also can affect disease dynamics. While a descriptive understanding of some cases exists, there is little mechanistic understanding of basic ecological and social-ecological principles that underlie such complex systems. Few of these advances in ecological science have been systematically related to economic and social changes, applied to agricultural systems, or linked to biomedical or veterinary research and public health. The need to develop models that accurately represent and predict disease transmission dynamics will require the integration of well-designed experiments, data collection across different scales, and creative model development.

We have improved our ability to define the molecular identity and dynamics of pathogens or infectious agents and their vectors, and have greatly increased our understanding of the defense systems of their hosts. We understand better the importance of genetic systems and evolutionary dynamics of infectious diseases. These improvements have contributed significantly to our knowledge of the epidemiology and transmission patterns of diseases. However, the relationship of these factors to population dynamics of disease reservoirs or the biotic and structural complexity of ecological, agricultural, and socio-ecological systems in which transmission occurs remains poorly understood. For example, little is known about how the transmission dynamics of pathogens within a common host are affected by the interactions of multiple pathogenic and non-pathogenic organisms with each other or with the host's physiology. In addition, although these dynamics take place in evolutionary time of the pathogens or infectious agents,

insufficient attention has been given to integrating ecological, evolutionary, and socio-economic dynamics.

At present, both basic and applied research in infectious disease ecology is often piecemeal. The potential benefits of an interdisciplinary research program in this area include: development of disease transmission theory, improved understanding of unintended health effects of development projects affecting terrestrial freshwater and coastal systems, increased capacity to forecast outbreaks, novel strategies to mitigate or prevent infectious diseases and improve biosecurity, and improved understanding of how diseases (re)emerge. An under-studied aspect of disease transmission is the importance of socio-ecological factors and processes.

Important new insights into the drivers and control of infectious diseases in human populations can only be achieved by taking a holistic approach which takes into account the ways in which the natural and social environments affect the emergence and spread of infectious disease. This concept, often called "one health," links medical and veterinary science by drawing on a common pool of knowledge between the two sectors in order to exploit the potential of animal disease research to provide insights into human health.

Considering the global nature of the threat of infectious diseases, international collaborations are encouraged. Of specific interest are collaborative partnerships between US scientists and UK biological and social scientists that focus on the importance of socio-ecological factors and processes in disease transmission.

This activity is a continuation of the previous joint National Science Foundation/National Institutes of Health (NSF/NIH) Ecology of Infectious Disease competition. Information on past awards can be found at EID Awards and http://www.fic.nih.gov/programs/research_grants/ecology/index.htm. A review of this program can be found at: http://www.fic.nih.gov/programs/research_grants/ecology/eid_review2005.pdf.

II. PROGRAM DESCRIPTION

The goal of the Ecology of Infectious Diseases (EID) activity is to fund the development of predictive understanding of the transmission dynamics and evolution of infectious agents through the discovery of general principles and processes, and the building of models. To that end, research should focus on understanding the ecological, evolutionary and socio-ecological determinants of transmission by vectors or abiotic agents, the population and evolutionary dynamics of reservoir species, the dynamics of social and economic systems, and transmission to humans, other animals or plants, and recognize that the interactions of disease-causing agents, their hosts, and the environment are usually embedded within complex systems. **The most competitive proposals are those that advance broad, conceptual knowledge that reaches beyond the specific system under study and that may lead to use in policy or practices pertaining to public health, natural resource use, or economic development.**

Funded research should aim beyond description to achieve mechanistic insights into disease dynamics. While the aim of this activity is to produce predictive or explanatory models, such models could be analytic, computational, or statistical. Any such model, though, should provide general understanding beyond the specific system under study. In addition, the conceptual model that underpins the explanatory model should serve as the central organizing principle of the project. Models must include estimates of uncertainty and, when appropriate and possible, experiments should be designed to attain a high level of precision. Proposals should indicate how they will validate or verify any model and how the model will advance our conceptual understanding of disease dynamics. Proposals should identify which individual(s) will oversee the quantitative approaches and provide evidence of their demonstrated expertise in data collection, mathematical modeling, and/or data analysis.

A variety of topics, questions and approaches are appropriate. Research could focus on particular infectious agents, individual diseases, or groups of diseases, and might involve one or more social systems, regions, habitats, or groups of organisms. Depending on the hypotheses or research questions being addressed, investigations might entail some combination of laboratory experiments, field observations or manipulations, public health interventions, social surveys, ethnographic studies, novel analyses of existing data, theoretical investigations of ecological and evolutionary dynamics. Multidisciplinary studies are encouraged. Field investigations that elucidate extensive temporal and/or spatial patterns from nature are among those most likely to yield important insights. Such insights are likely to be gained through integrating work among several scales of observation, including molecular, individual, population, and regional levels of analysis. Analytical use of remote sensing, geographic information systems, and other information technologies may contribute to such efforts.

Investigations may also consider dynamic processes using model biological and bio-social systems in natural or laboratory settings. New insights gained from the study of biological interactions involving organisms, ecological settings, or geophysical and geochemical systems other than those of ultimate concern may very well improve our understanding of complex interactions in natural ecological systems.

The primary focus of the research should be on ecological dynamics related to the population dynamics, evolution, and transmission of pathogens. Analysis of environmental, geophysical, and social influences on the susceptibility of individuals or populations to infection by particular agents is appropriate. However, the research must include a substantial focus on the underlying ecological parameters that influence transmission, evolution, and infection. Questions involving the evolution of pathogens and hosts within an ecological, socio-economic, or geophysical context are appropriate. Outside the scope of this activity are investigations focused simply on genetic patterns or evolutionary change in disease-causing organisms or hosts without considering their importance for ecological dynamics. The research can involve the collection or development of new data, the re-analysis of existing data, or both.

Proposals may focus on terrestrial, freshwater, or marine systems and organisms. They may include diseases of humans, non-human animals, or plants. **Diseases affecting humans must have an environmental transmission component; research on solely human-to-human transmitted disease systems are not eligible for EID support.** Proposals for research on disease systems of public health concern to developing countries, including potential pandemic diseases, are encouraged. Investigators are encouraged to include links to the public health research community, including expertise from epidemiologists, medical entomologists, physicians, veterinarians, medical scientists, veterinary scientists, social scientists, microbiologists, pathologists and parasitologists.

Because of the complexity of such studies, establishment of multidisciplinary teams of domestic and international collaborators with expertise from diverse disciplines are likely to be most effective. Integrated, collaborative efforts might involve infectious disease epidemiologists, physicians, veterinarians, population ecologists, geneticists, oceanographers, statisticians, immunologists, microbiologists, geologists, taxonomists, molecular biologists, hydrologists, environmental health scientists, sociologists, economists, anthropologists, climatologists, or mathematical modelers. The research plan should indicate how multiple disciplines will be integrated and how new investigators in U.S. and collaborating foreign institutions will be prepared to conduct future multidisciplinary Ecology of Infectious Disease research projects.

The EID competition broadly welcomes projects that include international collaborators. One specific form of collaboration (US-UK Collaborative Projects) is described below. This specific activity does not preclude other international collaborations. Nor does it require that a proposal have an international collaborator.

US-UK Collaborative Projects

Recognizing the potential for international collaboration to advance EID research and education objectives, NSF has partnered for this solicitation with the Biotechnology and Biological Sciences Research Council (BBSRC) and Economic and Social Research Council (ESRC) of the U.K.This partnership will facilitate coordinated funding of U.S. and U.K. research collaboration. The two Research Councils are part of a wider collaboration of funders supporting a U.K. initiative on the Environment and Social Ecology of Infectious Disease (ESEI). It is anticipated that these US-UK Collaborative Projects will build on the U.K. capacity developed through

the ESEI call and address international research priorities that will inform and impact on policy and practice.

Important new insights into the complex social and biological drivers, processes, consequences and control of infectious diseases in human populations can only be achieved by taking an interdisciplinary and integrated holistic approach which takes into account the ways in which the natural, social and economic environments affect the emergence, spread and re-emergence of infectious disease. It is necessary to link medical and veterinary science by drawing on a common pool of knowledge between the two sectors in order to exploit the potential of animal disease research to provide insights into human health, a concept called "one health."

A topic of particular interest for the UK funders is **'Infections of Zoonotic Origin'** and the funders are particularly keen to receive proposals for studies to better understand animal reservoirs as a source of infectious diseases, how animal pathogens spill-over into human populations, and the spread of those pathogens through and between communities in the UK or other parts of the world. The aim is to fund research into pathogens that are considered to be a significant threat to public health now or in the future. This might include consideration of:

- Understanding host/pathogen interactions and factors influencing transmission both between animals, from animals to human populations (via direct contact, vectors or foodborne routes) and between humans. This would include investigation of the pathogen, pathways and those who are ultimately infected and the social and environmental systems within which they operate;
- Foodborne zoonoses, especially diarrhoeal diseases are important cause of morbidity and mortality world-wide. Understanding origins, transmission pathways, emergence and persistence of foodborne pathogens including how they survive in food chain, role of abiotic sources in transmission, human and socio-economic behaviour would be of public health importance. Studies could consider a 'community' of infections including but not limited to *E.coli*, *Salmonella* and *Campylobacter*, monitored to determine rates of current infection but also, if possible, exposure;
- Understanding how infectious disease transmission is influenced by changes in population structure, including an aging population, social epidemiology, and the spatial distribution of populations, including the ways people mix within society e.g. through transport systems, urbanization and migration, household size or formation, travel and social activities;
- Understanding how genes function, mutate, move, transfer and recombine subject to ecological conditions/pressure on the pathogen and the social factors that may affect circulation and multiple exchanges between people and animals. A greater depth of understanding is needed of the emergence of zoonoses in complex exchange sites;
- Understanding the geographies and politics of global infection including: understanding patterns of inequality and how inequality can act as a driver of infection as well as a driver of response and control; understanding the political economy of infections and the role of industry, international organizations and governments worldwide;
- Understanding how infectious disease transmission influences and is influenced by global governance systems: understanding international governance and the response required for emerging infections including public health planning and management systems, infrastructure e.g. transport systems and other vital systems and services;
- Understanding how infectious disease transmission is influenced by the role of the behavior of individuals, particularly in differing and changing cultural and social contexts. Examples include responses to vaccination policies, health seeking behavior, and the economic impacts of controls of disease spread in agricultural systems. Understanding the role of experiential, informal and culturally grounded knowledge and media communication of risk and how it affects behavior;
- Modeling (including systems) approaches including testing and validation.

Research that makes use of new tools and technologies to address these issues are welcomed.

For US-UK projects the international consortium as a whole must demonstrate a multidisciplinary approach e.g. integrating the Environmental, Social, Biological and Health Sciences domains as appropriate within their international team. However, the UK component must be within the remit of the BBSRC and/or ESRC.

Any applicant wishing to apply for a US-UK Collaborative Project should contact the main UK Cognizant Program Officer at BBSRC or ESRC to discuss the remit of their proposal and to confirm that the UK component is appropriate, falls within the BBSRC or ESRC remit and is sufficiently substantive.

U.K. researchers applying under this heading must meet normal BBSRC and/or ESRC eligibility requirements, and must apply through an institution eligible to receive BBSRC and/or ESRC funding. Please see ESRC and BBSRC funding rules: http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/opportunities/research_funding/?; http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx. If UK applicants are unsure of their eligibility, they should contact the appropriate Cognizant Program Officer for confirmation. Applications with non-eligible U.K. partners will not be considered for funding as a US-UK Collaborative Project.

Proposals which include collaborations with non-eligible U.K. partners and those where the UK component of the study does not fall within the remit of BBSRC or ESRC, are eligible to apply to this competition outside of this special subcategory; contact one of the Program Officers if you have questions concerning such other proposals.

Research Coordination Network Projects (RCN)

The EID program will accept proposals to establish Research Coordination Networks that focus on issues involving infectious disease ecology, socio-ecology, and evolution. Information on the scope of RCN projects and the format of those proposals can be found at **(http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11691&org=BIO&from=home)**. Such RCN proposals should be submitted under the EID solicitation and deadline.

III. AWARD INFORMATION

Under this solicitation, the maximum total (for all years) award size is $2.5 million, including indirect costs, and the maximum award duration is five years. US-UK Collaborative Projects can request additional funding for the UK component of the project. Approximately 8 new awards are anticipated in FY 2011, depending on the quality of submissions and the availability of funds; the expected funding will be $10 million. That amount includes approximately $7M from NSF for new standard or continuing awards, and approximately $3M from NIH for new continuing awards. Of those awards, 2-6 are anticipated to be US-UK Collaborative Projects, depending on the quality of submissions and the availability of funds; the expected funding from the BBSRC and ESRC will be a maximum of £1,800,000. This amount reflects 80% of the full economic costs in the U.K.

Upon conclusion of the review process, meritorious proposals may be recommended for funding by either NSF or NIH, at the option of the agencies, not the proposing organizations. Proposals selected for funding by NIH will need to be reformatted and resubmitted to that agency. Subsequent submission and grant administration procedures will be in accordance with the individual policies of the awarding agency.

For US-UK Collaborative Projects, the UK component of the collaboration will be awarded either through the ESRC or BBSRC in accordance with the policies of that agency. If the BBSRC or ESRC select an application for funding, the Research Councils will require that the costs for the UK element of the proposal be submitted via the RCUK's Je-S application submission system before final sign-off. UK collaborators should therefore ensure they are registered Je-S users before the proposal is submitted.

IV. ELIGIBILITY INFORMATION

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number 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.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Special Information and Supplementary Documentation:

Letters of Commitment

Projects requiring contributed effort or resources by an individual or organization not directly supported under this proposal should submit a signed letter of commitment using the template below:

To: NSF EID Program

By signing below I acknowledge that I am listed as a collaborator on this EID proposal, entitled "_____ *proposal title*_____," with _____*PI name*_____ as the Principal Investigator. I agree to undertake the tasks assigned to me, as described in the proposal, and I commit to provide or make available the resources therein designated to me.

Signed: _____ Print Name: _____

Date: _____ Institution: _____

The Project Description should document the nature and need for the collaboration. Each statement must be signed by the designated collaborator. Requests to collaborators for these statements should be made by the PI well in advance of the proposal submission deadline, since they must be included at the time of the proposal submission. Letters deviating from this template in any way **will not be accepted** and may be be grounds for returning the proposal without review.

Oceanographic Platform Support

For projects requesting ship time on a research vessel operated under the University-National Oceanographic Laboratory System (UNOLS), a copy of the UNOLS request form should be included as **Supplementary Documentation**. The UNOLS form may be obtained from the NSF Division of Ocean Sciences Ship Operations Program, National Science Foundation by calling (703) 292-8581, or directly from the UNOLS World Wide Web site at http://www.unols.org. UNOLS costs should not be included in the proposal budget; however, costs for the use of non-UNOLS research platforms must be included in the proposal budget.

US-UK Collaborative Proposals

These proposals should begin the title with "**US-UK Collab:**"

Information for the UK portion of US-UK Collaborative Proposals should be included as **Supplementary Documents**. That information should include:

1. **Biographical sketches of UK senior personnel:** Those biographical sketches must conform to NSF format and limitations.

2. **UK budget:** Costs for the UK component of the project should be entered onto the Je-S system but the the completed form SHOULD NOT be submitted electronically to the ESRC or BBSRC at this stage. Instead, a PDF version of the form should be saved and sent to the US lead PI for inclusion as a **supplementary document** in the proposal. Full details on what is required can be obtained at [http://www.esrcsocietytoday.ac.uk/infectiousdiseases].

   Applicants should ensure that they contact the main UK Cognizant Program Officer at BBSRC or ESRC to discuss the remit of their proposal and to confirm whether they should complete an ESRC or a BBSRC Je-S form.

   The researchers will be asked to attend a meeting to be held at either the National Science Foundation or an alternate location. Include the necessary travel costs for attendance at the meeting in the proposed budget

3. **Letters of collaboration:** Letters of collaboration from UK scientists are required. **These letters must be restricted to a statement of intent to collaborate only.** Additional information on the nature of the collaboration and the roles of the investigators should be included in the Project Description.

4. **Institutional endorsement:** An institutional certification of the submission must be a signed letter from an authorized U.K. institutional representative with the following text: "I confirm on behalf of [insert name of institution] that the U.S.-U.K. Collaborative proposal between [insert name of US PI and institution] and [insert name of UK PI] is endorsed and has been submitted by [name of Research Office]."

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

Budget Preparation Instructions:

Every year, the PI's of the EID awards (including the UK PIs of US-UK awards) will be asked to attend a meeting to be held at either the National Science Foundation or an alternate location. Include the necessary travel costs for attendance at the meeting in the proposed budget.

Subawards

In accordance with the applicable award terms and conditions, proposers are reminded of their responsibilities with regard to subawardees. Should an award be made, the prime awardee is responsible for flowing down the appropriate terms and conditions to, as well as management and oversight of, any subawardees on the project, including any foreign subawardees.

C. Due Dates

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

  December 15, 2010

D. FastLane / Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of 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 Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

  Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: http://www.grants.gov/CustomerSupport. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

  Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

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. NSF Merit Review 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 judgements.

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: http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

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.

Additional Review Criteria:

- Significance: Does the project address an important problem or a critical barrier to progress in the field? If the aims of the project are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved? How will successful completion of the aims change the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field?
- Investigator(s): Are the PD/PIs, collaborators, and other researchers well suited to the project? If Early Stage Investigators or New Investigators, do they have appropriate experience and training? If established, have they demonstrated an ongoing record of accomplishments that have advanced their field(s)? If the project is collaborative or multi-PD/PI, do the investigators have complementary and integrated expertise; are their leadership approach, governance and organizational structure appropriate for the project?
- Innovation: Does the application challenge and seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions? Are the concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense? Is a refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?
- Approach: Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project? Are potential problems, alternative strategies, and benchmarks for success presented? If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?
  If the project involves clinical research, are the plans for 1) protection of human subjects from research risks, and 2) inclusion of minorities and members of both sexes/genders, as well as the inclusion of children, justified in terms of the scientific goals and research strategy proposed?
- Environment: Will the scientific environment in which the work will be done contribute to the probability of success? Are the institutional support, equipment and other physical resources available to the investigators adequate for the project proposed? Will the project benefit from unique features of the scientific environment, subject populations, or collaborative arrangements?
- ***Biohazards.*** Reviewers will assess whether materials or procedures proposed are potentially hazardous to research personnel and/or the environment, and if needed, determine whether adequate protection is proposed.

Where relevant, proposals will also be reviewed with respect to the following:

- ***Protections for Human Subjects.*** For research that involves human subjects but does not involve one of the six categories of research that are exempt under 45 CFR Part 46, the reviewers will evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: 1) risk to subjects, 2) adequacy of protection against risks, 3) potential benefits to the subjects and others, 4) importance of the knowledge to be gained, and 5) data and safety monitoring for clinical trials.

  For research that involves human subjects and meets the criteria for one or more of the six categories of research

that are exempt under 45 CFR Part 46, the reviewers will evaluate: 1) the justification for the exemption, 2) human subjects involvement and characteristics, and 3) sources of materials.

- ***Inclusion of Women, Minorities, and Children.*** When the proposed project involves clinical research, the reviewers will evaluate the proposed plans for inclusion of minorities and members of both genders, as well as the inclusion of children.
- ***Vertebrate Animals.*** The reviewers will evaluate the involvement of live vertebrate animals as part of the scientific assessment according to the following five points: 1) proposed use of the animals, and species, strains, ages, sex, and numbers to be used; 2) justifications for the use of animals and for the appropriateness of the species and numbers proposed; 3) adequacy of veterinary care; 4) procedures for limiting discomfort, distress, pain and injury to that which is unavoidable in the conduct of scientifically sound research including the use of analgesic, anesthetic, and tranquilizing drugs and/or comfortable restraining devices; and 5) methods of euthanasia and reason for selection if not consistent with the American Veterinary Medical Association Guidelines on Euthanasia.

For all proposals involving international collaborations, reviewers will consider: mutual benefits, true intellectual collaboration with the foreign partner(s), benefits to be realized from the expertise and specialized skills, facilities, sites and/or resources of the international counterpart, and active research engagement of U.S. students and early-career researchers, where such individuals are engaged in the research.

US-UK Collaborative Projects will also be reviewed with respect to the extent which they demonstrate a substantial collaboration between the US and UK partners and enhance research on the socio-ecological and biological dimensions of infectious disease transmission. The review will take into account the UK research context.

B. Review and Selection Process

NSF will manage the review of proposals in consultation with NIH, and in the case of US-UK Collaborative Projects, the ESRC and the BBSRC. Proposals and reviews will be shared with the partner funding organizations as appropriate.

Proposals submitted in response to this program solicitation will be reviewed by

Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF Process: Those proposals selected for funding by NSF will be handled in accordance with standard NSF procedures. 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 is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, 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.

In all cases, 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 and 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.

NIH Process: Proposals selected for funding by NIH will need to be reformatted and resubmitted to that agency. Subsequent submission and grant administration procedures will be in accordance with the individual policies of the awarding agency.

US-UK Collaborative Projects: The UK component of the collaboration will be awarded either through the ESRC or BBSRC in accordance with the policies of that agency. If the BBSRC or ESRC select an application for funding, the Research Councils will require that the costs for the UK element of the proposal be submitted via the RCUK's Je-S application submission system before final sign-off. UK collaborators should therefore ensure they are registered Je-S users before the proposal is submitted.

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 letter, 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 letter; (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 letter. 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 http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications

Clearinghouse, telephone (703) 292-7827 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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

ESRC and BBSRC Awardees are subject to ESRC and BBSRC reporting and administration requirements as appropriate and outlined in the ESRC Research Funding Guide at http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC%20Research%20Funding%20Guide%20July%202010_tcm6-9734.pdf and the BBSRC Research Funding Guide at http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx

US-UK Collaborative Projects should report on activities of the entire collaborative effort and submit that information to both NSF and ESRC or BBSRC as part of the annual and final reports.

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 at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after 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 that PI. 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 FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using 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.

NIH Awardees are subject to NIH reporting and administration rules and processes for annual renewal of their awards as outlined at: http://grants.nih.gov/grants/policy/policy.htm and in the Notice of Grant Award.

ESRC Awardees are subject to ESRC reporting and administration requirements as outlined in the ESRC Research Funding Guide at http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC%20Research%20Funding%20Guide%20July%202010_tcm6-9734.pdf. US-UK Collaborative Projects should report on activities of the entire collaborative effort and submit that information to both NSF and ESRC as part of the annual and final reports.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Samuel M. Scheiner, Program Director, telephone: (703) 292-7175, email: sscheine@nsf.gov
- Joshua Rosenthal, Program Director, FIC/NIH, telephone: (301) 496-1653, fax: (301) 402-0779, email: joshua_rosenthal@nih.gov
- Phillip R. Taylor, Section Head, telephone: (703) 292-7715, email: prtaylor@nsf.gov
- Deborah Winslow, Program Director, SBE/NSF, telephone: (703) 292-7315, email: dwinslow@nsf.gov
- Teresa Wysocka, Research Development Manager, ESRC, telephone: 44 1793-442859, email: Teresa.wysocka@esrc.ac.uk
- Sadhana Sharma, Strategy and Policy Manager-Animal Health, BBSRC, telephone: 44 1793-412099, email: sadhana.sharma@bbsrc.ac.uk

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.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, National Science Foundation Update is a free e-mail subscription service 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 Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the NSF web site.

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

A notice on the Ecology of Infectious Disease research initiative and this announcement is also posted in the NIH Guide to Grants and Contracts http://grants.nih.gov/grants/guide/index.html, along with all NIH opportunities.

Information about this initiative and announcement are also available on the ESRC website on the 'International Funding Opportunities' pages:
http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/opportunities/international/index.aspx.

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 40,000 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 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 provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 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 http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **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 Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records, " 69 Federal Register 26410 (May 12, 2004). 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 3145-0058. Public reporting burden for this collection of information is estimated to average 120 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
Division of Administrative Services
National Science Foundation

Arlington, VA 22230

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