



CALL FOR PROPOSALS IN A JOINT NSF-BSF PROGRAM IN ECOLOGY AND THE EVOLUTION OF INFECTIOUS DISEASES (EEID)

The U.S. – Israel Binational Science Foundation (BSF) is accepting applications in joint funding programs in Ecology and Evolution of Infectious Disease (EEID), with the Environmental Biology Division (DEB), in the Biological Science Directorate (BIO) of the U.S. National Science Foundation (NSF), and in cooperation with other agencies.

The terms of this program are as follows:

General:

- 1. This NSF-BSF program is not a “special” program with the NSF setting aside money for potential grants. Rather, it is an integral part of the regular NSF programs in this discipline, with no “special” funds. Clear understanding of it by the U.S. partner is essential before embarking on proposal writing.**

Synopsis of the Program:

The goal of the Ecology and Evolution of Infectious Diseases (EEID) program is to support important and innovative research on the ecological, evolutionary, and socio-ecological principles that influence the transmission dynamics of infectious diseases. The program's focus is on the discovery of general principles and processes and on building and testing models that elucidate these principles. **Projects must address the quantitative or computational understanding of pathogen transmission dynamics.** Research in EEID is expected to be an interdisciplinary effort that goes beyond the scope of typical studies funded by the standing programs of the partner agencies. Projects should bring together such areas as anthropology, bioinformatics, computational science, ecology, economics, epidemiology, evolution, food science, genomics, geography, global health, mathematics, medicine, microbiology, oceanography, plant science, population biology, sociology, physical environmental sciences, systems science, and veterinary medicine. Research within EEID is expected to generate rigorously characterized and tested models that are of value to the scientific community, but also may be useful in decision making. **The history of the EEID program has shown that the most competitive proposals are those that advance broad, conceptual knowledge that reaches beyond the specific system under study and that may be useful for understanding public, agricultural or ecosystem health, natural resource use and wildlife management, and/or economic development. Such proposals**



are typically interdisciplinary in their approach and/or the nature of the question(s) being addressed.

Infectious disease transmission reflects complex, dynamic relationships that occur on varying spatial and temporal landscapes, are created by both ecological and evolutionary processes, and are revealed in genome architecture, physiological systems, population dynamics, and community structure, as well as behavioral and social dynamics. The interactions between disease-causing organisms, their vectors, and their host(s) are embedded within much larger networks of interacting systems, including other microorganisms that may or may not cause disease, one or more vector species, and multiple host species. Analysis of environmental influences (biological, geophysical, economic, and social) on individual and population susceptibility is fundamental to understanding these complex systems of infectious diseases. Research into the ecology (population, community, evolutionary, and social) of infectious diseases will contribute to a deeper understanding of these complex infectious disease systems, to the development of well characterized and tested models, and to the elucidation of general ecological and evolutionary principles.

Insights into the dynamics of infectious disease systems may require integration across several temporal, spatial, and functional scales including molecular, individual, population, societal, and ecosystem levels. Similarly, they may require integration across biological, socio-economic, and geophysical domains. The field of evolutionary ecology, which focuses on both the importance of ecological context in studies of evolution and the importance of evolutionary change for ecological systems, may also provide important insights into infectious disease systems. The interplay of evolution and ecology has implications for understanding how infectious agents emerge as pathogens, adapt to one or more hosts, interact with other microbial communities (e.g., microbiome), and are transmitted among hosts.

A critical goal of research supported by this program is the generation of principles and conceptual frameworks that organize and inform the research and that lead to mathematical, computational, and statistical models of infectious disease dynamics. Diverse modeling approaches are appropriate, including, but not limited to, mathematical equations, computational simulations, geospatial algorithms, and statistical models. **For the EEID program, the most competitive proposals are organized around an overarching conceptual framework that leads to such a model.** Models should aim to be explanatory beyond the specific system under study and must be well-characterized and rigorously tested. Proposals must describe how models will be developed, evaluated, and disseminated. Proposals must identify which individual(s) will oversee the quantitative approaches and provide evidence of demonstrated expertise in mathematical, computational, or statistical modeling and/or data analysis. Likewise, strategies for data collection must be well designed



to contribute to and test model design. Proposals must include plans for dissemination of data, models, and tools developed by this program.

A variety of *topics, questions, systems and approaches* are appropriate. Among the areas of particular interest are: the role of social influences on the susceptibility of individuals or populations; multiway interactions between pathogenic and non-pathogenic organisms and their mutual hosts; the role of medical, agricultural or environmental practices on pathogen emergence and transmission; emergence of pathogens from non-pathogenic populations; host switching; evolutionary dynamics in an ecological context such as disease control interventions and drug resistance. These topics have significant ecological and evolutionary components that should be studied as a system, not in isolation. Depending on the hypotheses or research questions being addressed, investigations might entail some combination of laboratory experiments, field observations or manipulations, public health interventions (although clinical trials are beyond the scope of the EEID program), analysis of social and cultural processes, or ethnographic studies. Research may also focus on novel analyses of existing data and/or theoretical investigations of ecological and evolutionary dynamics. Investigations may focus on model infectious disease systems in natural (terrestrial, freshwater, or marine) or laboratory settings where those systems elucidate general principles.

Research may use a variety of study systems. The organism(s) or system(s) selected for study should be justified with respect to its suitability to study questions of ecology and/or evolutionary ecology. Research may involve a variety of infectious agents, individual diseases, or groups of diseases, and might involve one or more social systems, regions, habitats, or groups of organisms. Proposals may focus on terrestrial or aquatic systems and organisms and may include infectious diseases of humans, non-human animals, or plants.

Regardless of the system or approach taken, a proposal must have a significant focus on the ecology of pathogen transmission to be eligible for funding. Because of the complexity of studies on the ecology and evolutionary ecology of infectious diseases, multidisciplinary teams of domestic and international collaborators with expertise from diverse disciplines are likely to be most effective. Investigators are encouraged to develop collaborations with public health research communities where that is appropriate. Collaborative teams could include, for example: ecologists, epidemiologists, medical scientists, veterinary scientists, oceanographers, evolutionary biologists, social and behavioral scientists, entomologists, food scientists, microbiologists, pathologists, and parasitologists, geologists, hydrologists, geospatial analysts, and mathematical scientists. 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 further this research.

The EEID program is not intended to be the only avenue of support by the participating agencies for supporting research on infectious diseases. Specifically, proposals

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submitted in response to this announcement must address ecological dynamics and among-host transmission, even when evolutionary studies are a substantive part of the proposal. Investigations that are outside the scope of this EEID announcement include:

- those limited solely to genetic patterns of evolutionary change (e.g., comparative genomics),
- those that focus solely on human diseases without considering the broader ecological context,
- those that focus solely on pathogen discovery,
- those that focus solely on within-host biological processes,
- those that focus solely on vector species ecology, and
- those that have not pre-identified at least one pathogenic organism that will be the focus of the study,
- those that focus on antimicrobial resistance without considering pathogen transmission dynamics.

For a full program description please read the NSF solicitation here:

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5269

2. **Prior to submission, the U.S. applicant should contact the appropriate NSF program manager to discuss the research focus of the international project.**
3. Applications are to be submitted to the NSF according to its submission regulation, even if the application may eventually be chosen for a grant by the NIH or USDA. See the NSF solicitation for further details on the joint review process.
4. Applications must be submitted jointly by an Israeli, and an U.S. scientist from a U.S. research institution. The addition of a UK, or a Chinese scientist to the proposal, to form a multinational proposal, is also allowed.
5. The NSF accepts applications only from U.S. scientists. Submission to the NSF should be made by the U.S. PI alone, but he/she has to note in the cover page that it is an “NSF-BSF Application” (the Israeli does not appear as a formal co-PI on the application). In the U.S.-Israeli applications, the role of the Israeli partner(s) must be described. Furthermore, it should be clearly explained why the contribution of the Israeli PI to the research project is important/essential.



6. If awarded a grant, the U.S. scientist will receive a grant from the NSF, while the Israeli scientist will receive a grant from the BSF.
7. The size of the BSF grant to the Israeli is expected to be up to \$80,000/year for experimental programs and up to \$55,000/year for theoretical or computer based research, **subject to the availability of funds**. If more than a single Israeli group is involved in the research, the budget may be increased by up to 50%.
8. BSF will follow the decision by the U.S. funding agency regarding the length of the project.
9. The program will use a single submission process, without a pre-proposal stage.
10. The program is expected to be held annually.
11. We have put together a short presentation with tips for Israeli PIs who are interested in submitting an NSF-BSF proposal. We advise that you read it carefully before starting to look for a partner. You can download it [here](#)

Eligibility

1. All inquiries regarding the eligibility of the research topic must be made by the U.S. PIs to the program directors at NSF. BSF will not respond to any query regarding topic eligibility.
2. All regulations regarding eligibility of the BSF (for the Israeli PI) or the NSF (for the U.S. PI) will apply to this program.
3. **Each Israeli scientist is allowed to submit up to two applications/year, if at least one of them is to any of the NSF-BSF programs that have no deadline.**
4. Israelis with active grants are allowed to submit an additional application **to any of the NSF-BSF programs with no deadline** (they don't have to wait for the last year of their grant before submitting).
5. It is allowed to submit both to an NSF-BSF program and the regular BSF program, including similar applications. In the event that both applications are awarded grants, they will be funded, unless the research applications are mostly similar, in which case only the NSF-BSF program will be funded.



6. In case of similar NSF-BSF and regular BSF applications, in which the NSF evaluation was not completed by the time the regular BSF awards are made, the BSF will defer its decision regarding a possible grant to this application, until the NSF-BSF awards are announced.

Evaluation

1. Proposals will be evaluated by the NSF, using its criteria. The BSF will create a small screening panel to quickly examine the role of the Israelis in the applications, and ascertain that it is meaningful, and that they have the knowhow and facilities to perform their part in the research. This panel will also advise the BSF regarding the budget requests, but will not evaluate the scientific merit of the applications. However, Israelis may possibly take part in the NSF evaluation process as panel members and/or external reviewers.
2. BSF is likely to fund any Israeli whose partner in this program is funded by the NSF.
3. NSF uses a conventional peer review system with expert panels and ad-hoc (external) reviews for full proposals. However, unlike the practice in Israel, panel members serve in an advisory capacity, and final decisions lie with the program managers and their management. These post-panel officials may introduce additional considerations, such as whether the research topic already has support from the U.S. government, whether support from other NSF programs may be sought, etc.
4. Israeli applicants are advised that they should pay particular attention to the NSF evaluation criteria, http://nsf.gov/bfa/dias/policy/merit_review/, which may include issues such as broader impact, data management, etc., that are either missing in BSF and ISF applications, or have a greatly different meaning (particularly the term 'broader impact'). **Failure to appropriately refer to such topics by the U.S. partner may be detrimental to the proposal, including its rejection without review.**

Submission

Proposals will be submitted to the program twice:

The U.S. scientist (only) will submit to the NSF using its regulations

(http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg) and submission system (<https://www.fastlane.nsf.gov/>). **The US PI submission to the NSF MUST include the**



BIOGRAPHY (in the NSF format) and BUDGET (in the BSF format) of the Israeli partner as part of the auxiliary material.

The Israeli scientist (only) will submit to the BSF, also providing the U.S. scientist information, according to its regulations and submission system: find [here](#).

Timetable

Full proposals should be submitted to the BSF no later than 5 pm (Israel time) on November 23, 2021. NSF deadline is November 17, 2021.

Applicants are requested to acquaint themselves with the BSF regulations before they submit an application. In particular, they should acquaint themselves with the special document that describes the changes in the submission process from the regular (core) BSF program. The forms and regulations can be downloaded from the BSF website (<https://www.bsf.org.il/funding-opportunities/nsf-bsf-joint-research-grants/the-programs/>).

Questions regarding the applicability of the proposed research for this program should be directed by the U.S. partner to the program officer at the NSF. BSF will not respond to such inquiries. Other questions regarding this special BSF-NSF program can be discussed with the BSF management by mail or phone (972-2-5828239): Dr. Rachel (Heni) Haring (heni@bsf.org.il; ext 110) or Ms. Yael Dressler (yael@bsf.org.il; ext. 103). Questions regarding the online application system should be directed to Ms. Orli Rozenchwajg (orli@bsf.org.il; ext .109).