Assembling the Tree of Life (ATOL)

PROGRAM SOLICITATION
NSF 10-513

REPLACES DOCUMENT(S):
NSF 09-522

National Science Foundation

Directorate for Biological Sciences
   Division of Environmental Biology

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

   March 22, 2010

   Fourth Monday in March, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 11-1, was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in NSF 11-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in NSF 11-1.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/dmp.jsp. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

REVISION NOTES:

November 2010. This update to NSF 10-513 includes the following changes:

- Estimated number of awards and anticipated funding updated to reflect FY 2011 projections
- Requested duration of awards may be up to five years with a budget appropriate to the scope of the work proposed.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

   Assembling the Tree of Life (ATOL)

   To construct an evolutionary history for all major lineages of life.

Synopsis of Program:

   A flood of new information, from whole-genome sequences to detailed structural information to inventories of earth's biota to greater appreciation of the importance of lateral gene transfer in shaping evolutionary history, is

transforming 21st century biology. Along with comparative data on morphology, fossils, development, behavior, and interactions of all forms of life on earth, these new data streams make even more critical the need for an organizing evolutionary context. Phylogeny, the genealogical map for all lineages of life on earth, provides an overall framework to facilitate biological information retrieval, prediction and analysis. Currently, single investigators or small teams of researchers are studying the evolutionary pathways of heredity usually concentrating on taxonomic groups of modest size. Assembly of a framework phylogeny, or Tree of Life, for all major lineages of life requires a greatly magnified effort, often involving large teams working across institutions and disciplines. This is the overall goal of the Assembling the Tree of Life activity. The National Science Foundation announces its intention to continue support of creative and innovative research that will resolve evolutionary relationships for large groups of organisms throughout the history of life. Investigators also will be supported for projects in data acquisition, analysis, algorithm development and dissemination in computational phylogenetics and phyloinformatics.

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.

- Robb T. Brumfield, telephone: (703) 292-7207, email: rbrumfie@nsf.gov

- Maureen Kearney, telephone: (703) 292-8480, email: mkearney@nsf.gov

- Simon Malcomber, telephone: (703) 292-8770, email: smalcomb@nsf.gov

- Thomas Ranker, telephone: (703) 292-8610, email: tranker@nsf.gov

- Michael Whiting, telephone: (703) 292-7214, email: mwhiting@nsf.gov

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

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 1 to 6 awards anticipated in Fiscal Year 2011

Anticipated Funding Amount: $12,000,000 is the anticipated budget available to the program in FY 2011, pending the availability of funds. Each award, whether single-institution or collaborative project, may range up to durations of five years.

Eligibility Information

Organization Limit:

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

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:** Inclusion of voluntary committed cost sharing is prohibited.

- **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):

    March 22, 2010

    Fourth Monday in March, Annually Thereafter

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

Darwin's vision of the "great Tree of Life ... with its ever branching and beautiful ramifications" has challenged scientists and others for generations. Darwin's use of tree imagery inspired efforts to classify all the major groups of organisms, and to reveal the pattern of historical relationships that would explain the similarities and differences among them. Phylogenetic knowledge, by virtue of its explanatory power, has proven useful in many fields, such as choosing experimental systems for biological research, tracking the origin and spread of emerging diseases and their vectors, bioprospecting for pharmaceutical and agrochemical products, preserving germplasm, targeting biological control of invasive species, and evaluating risk factors for species conservation and ecosystem restoration. At the same time, progress in many disciplines from genomics to evolution and development is currently hampered by the lack of a rigorous phylogenetic framework to guide research.

The features of life's genealogy at the broadest scales have been captured in the three-domain model of Archaea, Bacteria, and Eukaryota, but relationships among many groups of organisms remain unanalyzed and unresolved. Patterns of phylogeny among the domains and among most phyla, the extent of web-like reticulate connections among lineages, and the tempo and mode of evolutionary change remain unknown for most lineages on earth. Despite the enormity of the task, with 1.7 million described species and the likelihood of vastly more yet to be discovered, now is the time to reconstruct the tree of life: the conceptual, computational and technological tools are available to resolve most, if not all major branches of the tree of life. Researchers in biological and computational fields have recognized both the need and the potential for success and have called for a national and international effort to Assemble the Tree of Life. There are currently five general goals:

1. To increase the numbers of taxa and data sets beyond current practice for extant and extinct organisms in order to resolve

phylogenetic relationships among major taxonomic groups (such as classes, phyla and even kingdoms);

2. A strong focus at present is on major taxonomic groups not yet addressed by current or previous AToL projects. This list includes, but is not limited to, major groups of prokaryotes, protists, protostomes, and viruses. Renewals of projects will not be considered in this year's competition in order to focus on large groups not yet addressed by the AToL program.

3. Research on and development of tools for computational phylogenetics and phyloinformatics. These projects might include the archiving and managing of phylogenetic data, matrices, trees and networks; collaborative work environments for large scale systematics; automated alignment and analysis workflows that integrate search and dataset assembly methods; software development to improve construction, visualization and navigation of the Tree of Life; assessment of empirical support and uncertainty in trees and networks; and exploration of the predictive capabilities of hierarchical structure in the Tree of Life;

4. A critical need at this point is to integrate across all major taxonomic groups and to produce the promised phylogenetic framework for the Tree of Life. We therefore invite proposals directed toward: 1) integrating and synthesizing all previous Tree of Life projects and all available data for critical major lineages; and 2) establishing a framework for integration of future AToL projects into a single, robust Tree of Life. Examples include coordination and collaboration across all AToL projects, including data sharing, incorporation of available data for major lineages, identification of 'core' genes conserved across major groups that can be used in analyses across all major lineages of the Tree of Life, identification of mechanisms that ensure a coordinated approach to data collection and data access across previous, current and future AToL projects, and integration with other projects working toward understanding of the tree of life, such as iPToL and ToLWeb;

5. Outreach and education in comparative phylogenetic biology and paleontology, emphasizing new training activities, informal science education, and Internet resources and dissemination.

II. PROGRAM DESCRIPTION

Projects for Assembling the Tree of Life are expected to be ambitious and large scale, and to include training, outreach, and dissemination components. When appropriate to the question under study, projects should include multiple investigators from multiple disciplines and multiple organizations. Tree of Life projects that are taxon-oriented will focus on phylogenetic resolution of large lineages or clades. This taxon focus is not intended to deflect interest in or attention to theoretical or analytical issues, particularly when the clade under study raises critical questions about the suitability or power of current phylogenetic methods of analysis, such as complexities caused by reticulate evolution and lateral gene transfer. Major taxonomic groups that have not yet been addressed by current or previous AToL projects are now an emphasis of this program. In addition to hypothesis-driven work, Tree of Life projects may also be method or theory-oriented, in which case they will address major analytical or computational problems in phylogenetic research and phyloinformatics. Tree of Life projects may also be synthesis-oriented, in which case they will address integration of current and future knowledge pertaining to the Tree of Life, and accessibility to that knowledge.

Tree of Life projects that are taxon-oriented should address the following issues:

- the broad taxonomic scope of research, with justification for the proposed large-scale approach beyond the scope of current single-investigator or small-team projects, as well as summaries of current classification (including identification of specialists in the taxa) and current phylogenetic knowledge of the group and closest relatives, fossil record and its concordance with patterns of evolutionary divergence, major collections or stocks or cultures and their availability for the study, and Internet resources relevant to these organisms;
- comprehensive plans for sampling and data collection, including choice of taxa and samples, rationale for chosen genes (i.e., how these genes will be available and useful for larger integration across broader taxonomic ranges), retrospective data capture, procedures for acquisition and quality control of new data, especially automated or high-throughput data, curation and vouchering of specimens and cultures (and extracts, images, etc.), and databasing of observations and associated specimens and cultures with appropriate annotation and Internet access; and
- description and justification of data analyses, with specific plans for dissemination of results, and including attention to tree-search criteria, data combinability and congruence, strategies for handling large data sets and for concatenating trees (if necessary), evaluation of tree robustness and of alternative topologies or networks, and archiving of datasets (specimens, characters, nomenclature, trees, character-by-taxon matrices), along with description of computer and software resources and expertise available to the project. Knowledge of, contribution to, and explicit coordination with appropriate major global database and portal efforts to disseminate taxonomic data are expected.

Tree of Life projects that are method or theory-oriented should address the following issues:

- description and justification of research in computational phylogenetics and phyloinformatics, on problems such as data acquisition and management, alignment and analysis of gene order, combinability of data whether genomic or morphological or both, tree-search or network strategies with very large datasets, measures of robustness and support, methods for linking or concatenating trees ("supertrees"), evaluating molecular clock estimates, integrating fossil evidence, and assessing empirical support and alternative topologies; hardware and software resources required for the project should be described, with plans for dissemination of products developed from the project;
- description and plans for archiving and managing data, trees, networks and associated character matrices and analytical methods from completed or ongoing phylogenetic projects, including development of efficient Internet tools for data submission from researchers in the community or other sponsors of phylogenetic research results; current NSF awardees conducting phylogenetic research are identifiable from the FastLane award abstracts posted on the NSF website (http://www.nsf.gov/awardsearch/);
- development of software for phylogenetic reconstruction, navigation, visualization, and query throughout the hierarchy of the Tree of Life and for data mining of associated character-by-taxon matrices developed as part of the project or available in other biological databases; and
- development of databases of taxonomic or clade-based names, including names at upper ranks of the formal hierarchies, with associated taxonomic synonyms and vernacular equivalents in the major international languages, to facilitate sophisticated query and data mining functions; this activity should be closely coordinated with global efforts in this area and should include the use of globally recognized data standards, with appropriate metadata, and service, or update to, at least one major electronic database or portal. Broad coordination with multiple providers is strongly encouraged.

Tree of Life projects that are synthesis-oriented should address the following issues:

- comprehensive plans for the completed taxonomic projects that will be included, as well as summaries of phylogenetic knowledge to date for those groups;
- strategy for integration of results, including choice of genetic markers and analytical methods, that will facilitate synthesis;

- description and justification for long-term synthetic activities to coordinate and integrate all Tree of Life projects and results;
- development of tools for archiving, managing, and querying the synthetic Tree of Life.

Regardless of approach taken, whether taxon-oriented or method-oriented, a mix or otherwise, all proposals for Assembling the Tree of Life should address the following issues including submission of a Management Plan:

- training and outreach activities, including field, laboratory, and/or museum experience for trainees, as well as communication among team members and expansion of the group if justified, integration with colleagues not formally part of the group whether national or international, and efforts to disseminate results to the public as well as to scientific communities. Hosting of workshops and other service activities are encouraged, to disseminate best-practices resulting from the project, new software, and other products. Activities designed to encourage participation of investigators at small institutions, minority serving institutions, community colleges, and secondary school teachers are encouraged; and
- a Management Plan should identify personnel responsible for all major tasks with time-scheduling across all members of the team for the duration of the project, with annual milestones for judging productivity and progress; describe curatorial, computational, sequencing, and informatics facilities and resources; describe plan for long-term preservation and research accessibility of collected samples; describe the database schema, if databases are being created as part of the project, including database design and metadata standards, interface for Internet query, and plans for maintenance beyond the duration of the grant, with identification of personnel charged with technical design and implementation; and describe plans for coordination with foreign-based projects on the same or related organisms. The Management Plan may be up to 5 pages in length and is in addition to the 15-page Project Description, and should be submitted in the Supplementary Documentation section of FastLane. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form.

III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. One to six awards are anticipated in FY 2011, made as standard or continuing grants, from the anticipated $12 million in FY 2011 available to the program.

IV. ELIGIBILITY INFORMATION

Organization Limit:

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

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.

The following instructions supplement GPG or NSF Grants.gov Application Guide guidelines.

Results from Prior NSF Support:

Be aware that if any PI or co-PI on the project has received NSF funding in the past five years, information on the prior award(s) is required. Each PI and co-PI who has received more than one prior award (excluding amendments) must report on the award most closely related to the proposal. The information required is described in the GPG and the NSF Grants.gov Application Guide. Reviewers will be asked to comment on the quality of the prior work described in this section of the proposal. Please note that the proposal may devote up to five pages to describe the results, within the maximum 15 pages of Project Description. Results may be summarized in fewer than five pages, which would leave the balance of the 15 pages for the Project Description.

Management Plan for Assembling the Tree of Life:

A Management Plan, up to 5 pages maximum, as described in the Program Description, should be included in the Supplementary Documentation section of the FastLane proposal. For Grants.gov users, supplementary documents should be attached in Field 11 of the R&R Other Project Information Form. This section, therefore, is in addition to the 15 pages of Project Description in the proposal, and should be coordinated with the research and education activities therein described.

Coordination among Projects for Assembling the Tree of Life:

If phylogenetic research on the chosen group of organisms is already funded by another NSF award (check the NSF FastLane website for award listings), the PI will be asked to provide a plan for coordinating activities with the funded project. If two or more proposals with substantially overlapping goals and scope remain in consideration for funding after initial merit review, the PIs of those proposals may be asked to collaborate, and to submit a coordination plan prior to the final funding decision.

International Opportunity:

The Tree of Life activity encourages laboratory-to-laboratory interactions between U.S. and foreign organizations to address Tree of Life goals. NSF funds may be requested to support foreign investigators and students to work in U.S. laboratories, and for U.S. investigators and students to work in international laboratories. However, foreign counterparts should secure support for their projects from their own national programs.

A "Conflicts of Interest" Document:

A "Conflicts of Interest" document must be included in the "Additional Single Copy Documents" section of the proposal. Include a table, in the format shown below, that lists the names of persons with conflicts of interest for all senior personnel (PI and co-PIs) and any named personnel whose salary is requested in the project budgets. Conflicts to be identified are: (1) Ph.D. thesis advisor or advisee; (2) postdoctoral adviser or advisee for the previous 48 months; (3) collaborators or co-authors for the past 48 months; and (4) any other individual or organization with which the investigator has financial ties (please specify). Organize the information as shown in the sample table here; list full names in each column in alphabetical order.

Last Name First Name Institution Conflict Type

Apple Alison A. Red College Ph.D. advisor for (Name)

Barley Barry B. Brown Institute Collaborator for (Name)

Raspberry Rudy R. White University Financial ties with co-PI2 (Name)

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

C. Due Dates

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

    March 22, 2010

    Fourth Monday in March, Annually Thereafter

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. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. 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 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: 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.

Additional Solicitation Specific Review Criteria

Reviewers will look for sound and imaginative responses to the Program Solicitation and will judge the degree to which proposed activities meet the overall goals for Assembling the Tree of Life. Reviewers will also pay close attention to the Management Plan, and they will take note of efforts to engage taxonomic specialists in the phylogenetic research proposed for the organisms under study.

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 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.

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.

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: For awards that include specimen collection activities, the awardee shall ensure that award activities carried on both inside and outside the U.S. and its territories and possessions are coordinated, as necessary, with appropriate Government authorities, and that appropriate licenses, permits, or approvals are obtained prior to undertaking proposed activities. NSF does not assume responsibility for awardee compliance with the laws and regulations of the country in which the work is to be conducted

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.

More comprehensive information on NSF Reporting Requirements 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.

The Principal Investigator shall provide a summary in the "Special Requirements" section of each annual and final project report, of all permits, licenses, or other necessary approvals associated with specimen collection. The information should include the names of all permits/licenses/necessary approvals, the granting authority, date acquired, duration, and the purpose of the permit/license/approval.

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:

- Robb T. Brumfield, telephone: (703) 292-7207, email: rbrumfie@nsf.gov

- Maureen Kearney, telephone: (703) 292-8480, email: mkearney@nsf.gov

- Simon Malcomber, telephone: (703) 292-8770, email: smalcomb@nsf.gov

- Thomas Ranker, telephone: (703) 292-8610, email: tranker@nsf.gov

- Michael Whiting, telephone: (703) 292-7214, email: mwhiting@nsf.gov

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.

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- **For General Information**   (703) 292-5111
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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
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