

Assembling the Tree of Life

To construct a phylogeny for the 1.7 million described species of life

Program Solicitation

NSF-02-074

DIRECTORATE FOR BIOLOGICAL SCIENCES
DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND ENGINEERING
DIRECTORATE FOR GEOSCIENCES
DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES

LETTER OF INTENT DUE DATE(S) (*optional*): March 29, 2002

FULL PROPOSAL DEADLINE(S): May 17, 2002



NATIONAL SCIENCE FOUNDATION



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 Web Site 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: pubs@nsf.gov
or telephone: (301) 947-2722
- **To Locate NSF Employees:** (703) 292-5111

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Assembling the Tree of Life

Synopsis of Program: A flood of new information, from whole-genome sequences to inventories of earth's biota, 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 framework for information retrieval, analysis, and prediction. Phylogeny, the genealogical map for all lineages of life on earth, provides an overall framework to facilitate information retrieval and biological prediction. Currently, single investigators or small teams of researchers are studying the evolutionary pathways of heredity within particular phyla or domains. Assembly of a framework phylogeny, or Tree of Life, for all 1.7 million described species requires a greatly magnified effort by large teams working across institutions and disciplines. This is the overall goal of the Assembling the Tree of Life activity. The National Science Foundation invites research proposals from multidisciplinary teams to conduct creative and innovative research that will resolve phylogenetic relationships for large groups of organisms on the Tree of Life. Teams of investigators also will be supported for projects in data acquisition, analysis, algorithm development and dissemination in computational phylogenetics and phyloinformatics.

Cognizant Program Officer(s):

- Matt Kane, Diana Lipscomb, James Rodman, Systematic Biology, Program Directors, Division of Environmental Biology, Room 635, telephone: 703-292-8481, e-mail: mkane@nsf.gov, dlipscom@nsf.gov, jrodman@nsf.gov.
- Sylvia Spengler, Biological Databases and Informatics, Program Director, Division of Biological Infrastructure, Room 615, telephone: 703-292-8167, e-mail: sspengle@nsf.gov.
- Richard Lane, Geology and Paleontology, Program Director, Directorate for Geosciences, Division of Earth Sciences, Room 785, telephone: 703-292-8551, e-mail: rlane@nsf.gov.
- Mark Weiss, Physical Anthropology, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, Room 995, telephone: 703-292-7321, e-mail: mweiss@nsf.gov.
- William Adrion, Division Director, Directorate for Computer & Information Science and Engineering, Division of Experimental and Integrative Activities, Room 1160, telephone: 703-292-8980, e-mail: wadrion@nsf.gov.
- Erik Nilsen, Ecological and Evolutionary Physiology, Program Director, Division of Integrative Biology and Neuroscience, Room 685, telephone: 703-292-7886, e-mail: enilsen@nsf.gov.
- Patrick Dennis, Microbial Genetics, Program Director, Division of Molecular and Cellular Biosciences, Room 655, telephone: 703-292-8443, e-mail: pdennis@nsf.gov.

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

- 47.074 --- Biological Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.050 --- Geosciences
- 47.075 --- Social, Behavioral and Economic Sciences

ELIGIBILITY INFORMATION

- **Organization Limit:** Proposals are invited from U.S. academic institutions, U.S. non-profit research institutions including natural history museums, marine laboratories and field stations, and botanical gardens, and consortia of such institutions with appropriate research and educational facilities (see NSF Grant Proposal Guide, NSF 02-02, Chapter I. Section C). When consortia of eligible individuals or institutions submit a proposal, it should be submitted as a single proposal with one institution serving as the lead institution or as a collaborative project (see GPG II.C.11b); "Group Proposals" are not allowed (GPG II.C.3). Where appropriate, collaborating scientists in foreign countries can be accommodated through consultant or participant support mechanisms administered by the submitting U.S. institution.
- **PI Eligibility Limit:** None
- **Limit on Number of Proposals:** None

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 3-6 awards anticipated in Fiscal Year 2002
- **Anticipated Funding Amount:** Approximately \$10M is anticipated in FY 2002, pending the availability of funds. Each award, whether single-institution or collaborative project, may range up to \$3M total, for durations up to five years.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is optional. Please see the full program announcement/solicitation for further information.
- **Full Proposals:** Supplemental Preparation Guidelines
 - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

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

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** March 29, 2002
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** May 17, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
 - Ms. Elaine Washington, FastLane Liaison, Division of Environmental Biology, Room 635, telephone: 703-292-7193, e-mail: biofl@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Additional award conditions apply. Please see the program announcement/solicitation for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

Darwin's vision of the "great Tree of Life ... with its everbranching and beautiful ramifications" has challenged scientists and others for generations. Darwin's use of tree imagery inspired efforts to classify and relate all the major groups of organisms, based on observable features, behaviors, and metabolic activities, culminating in a variety of conflicting multikingdom classifications for bacteria, protists, plants, fungi, and animals. The 1953 discovery of the chemical basis of heredity, in DNA, led to the demonstration of a universal genetic code, and in turn inspired molecular tool development for measuring and assessing genealogical relationships across all life. Phylogenetic information 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. Currently, the large-scale features of life's genealogy have been captured in the three-domain model of Archaea, Bacteria, and Eukaryota, but many branches of the overall Tree of Life remain unanalyzed and unresolved. Patterns of phylogeny within the domains and within most phyla, possible web-like connections among lineages, and the tempo and mode of evolutionary change remain unknown for most species on earth.

Despite the enormity of the task, with 1.7 million described species and the likelihood of vastly more yet to be discovered, researchers in biological and computational fields have recognized the power of new genomic and bioinformatic technologies, and have called for a national and international effort to Assemble the Tree of Life. Recent workshops supported by the NSF identify strategies for achieving the Tree of Life goal over the next 10-15 years (the web sites, <http://research.amnh.org/biodiversity/> and <http://www.biosci.utexas.edu/treeoflife/>, and the NSF web site, <http://www.nsf.gov/pubs/2001/bio012/start.htm>, host reports related to research for Assembling the Tree of Life). The reports describe three general goals:

- (1) Creation and support of multidisciplinary teams of investigators to scale up the numbers of taxa and data sets beyond current practice. These teams of investigators will emphasize acquisition and integration of molecular and morphological evidence on both extant and extinct organisms in order to resolve phylogenetic relationships of large, deep branches of the Tree of Life;
- (2) Research and development of tools for computational phylogenetics and phyloinformatics. These projects might include the archiving of phylogenetic matrices and trees; software development to improve visualization and navigation of the Tree of Life; assessment of empirical support and uncertainty in trees; and exploration of the predictive capabilities of hierarchical structure in the Tree of Life; and
- (3) 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, large scale, and to involve multiple investigators from multiple disciplines, likely from multiple institutions (for example, taxonomists, paleontologists, anthropologists, phylogeneticists, computer scientists, statisticians, experts in genome sequencing), and to include training, outreach, and dissemination components. 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 and 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. 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. The taxon-focus and method-focus approaches described here are intended for guidance only, and not as constraints on innovative projects for Assembling the Tree of Life.

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

- the 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, types of data (genomic, morphological, other phenotypic data), retrospective data capture, procedures for acquisition and quality control for new data, especially automatic or high-throughput data, curation and vouchering of material (and extracts, images, etc.), and databasing of observations and associated specimens or cultures with appropriate annotation and Internet access;
- description and justification of data analyses, with 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, 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.

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 combinability of data whether genomic or morphological or both, tree-search strategies with very large datasets, measures of tree robustness and support, methods for linking or concatenating trees ("supertrees"), evaluating molecular clock estimates and integrating with fossil evidence, and assessing empirical support and alternative topologies; hardware and software resources required for the project should be described, with plans for Internet dissemination of products developed from the project;
- description and plans for archiving of data, trees 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://fastlane.nsf.gov>);
- development of software for phylogenetic 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;
- 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 coordinated with the Federal ITIS (Integrated Taxonomic Information System, linked at <http://www.itis.usda.gov/>) and with the international "Species 2000" enterprise (see <http://www.sp2000.org>).

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 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. The 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;
- 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 informatic facilities and resources; 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.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. 3-6 awards are anticipated in FY 2002, made as standard or continuing grants, from the anticipated \$10M available to the program; each award, whether single-institution or collaborative project, may range up to \$3M total, for durations up to five years.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent: Applicants are strongly encouraged to submit a letter of intent before submitting a full proposal. The Letter of Intent is optional, and is to be sent electronically to the FastLane contact (Ms. Elaine Washington, biofl@nsf.gov) by close of business on March 29, 2002. Letters of Intent should be brief (two pages maximum). The letter should describe the overall goals of the project, key elements of the research approach, the institutions and facilities involved, and the identities of major participating individuals. Acknowledgment of Letters of Intent will be sent by e-mail within 10 working days of submission. Letters of Intent are for use by NSF staff in planning the review process; proposal review and funding recommendations will be based on the full proposals.

Full Proposal:

Proposals submitted in response to this program announcement/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 Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

BIO Proposal Classification Form (PCF):

Complete the BIO PCF, available on the NSF FastLane system. The PCF is an on-line coding system that allows the Principal Investigator to characterize his/her project when submitting proposals to the Directorate for Biological Sciences. Once a PI begins preparation of his/her proposal in the NSF FastLane system, selects any program within the Directorate for Biological Sciences as the first (or only) organizational unit to review the proposal, and saves the Cover Sheet, the PCF will be generated and available through the Form Preparation screen. Additional information about the BIO PCF is available in FastLane at ["http://www.fastlane.nsf.gov/a1/BioInstr.htm."](http://www.fastlane.nsf.gov/a1/BioInstr.htm)

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 that 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 Grant Proposal Guide (NSF 02-02, GPG II.C.3., available on the NSF website). 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 for 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 submission. 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 institutions 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 FastLane proposal submission. 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 institution 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.	Reed 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)

Color Images:

Be advised that NSF cannot accommodate the printing of color images as part of proposal submission through the FastLane system, and submitted proposals that require the use of color or of very high resolution photographic images will necessitate additional steps. See the Grant Proposal Guide, GPG Chapter I, Section E.1 "Special instructions for..."

Proposers are reminded to identify the program solicitation number (NSF-02-074) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Letters of Intent (*optional*): March 29, 2002

Full Proposals *by 5:00 PM local time*: May 17, 2002

Applicants are strongly encouraged to submit a letter of intent before submitting a full proposal. The Letter of Intent is optional, and is to be sent electronically to the FastLane contact (Ms. Elaine Washington, biofl@nsf.gov) by close of business on March 29, 2002. Letters of Intent should be brief (two pages maximum). The letter should describe the overall goals of the project, key elements of the research approach, the institutions and facilities involved, and the identities of major participating individuals. Acknowledgment of Letters of Intent will be sent by e-mail within 10 working days of submission. Letters of Intent are for use by NSF staff in planning the review process; proposal review and funding recommendations will be based on the full proposals.

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

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 certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two 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 he/she 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 and original 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?

NSF staff 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

Reviewers will look for sound and imaginative responses to the Program Description and 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 current taxonomic specialists in the phylogenetic research proposed for the organisms under study.

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 identities of reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail Review followed by 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 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 closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

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 one's 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 Division 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.A. 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 (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

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 PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

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.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, 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.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Assembling the Tree of Life should be made to:

- Matt Kane, Diana Lipscomb, James Rodman, Systematic Biology, Program Directors, Division of Environmental Biology, Room 635, telephone: 703-292-8481, e-mail: mkane@nsf.gov, dlipscom@nsf.gov, jrodman@nsf.gov.
- Sylvia Spengler, Biological Databases and Informatics, Program Director, Division of Biological Infrastructure, Room 615, telephone: 703-292-8167, e-mail: sspengle@nsf.gov.
- Richard Lane, Geology and Paleontology, Program Director, Directorate for Geosciences, Division of Earth Sciences, Room 785, telephone: 703-292-8551, e-mail: hlane@nsf.gov.

- Mark Weiss, Physical Anthropology, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, Room 995, telephone: 703-292-7321, e-mail: mweiss@nsf.gov.
- William Adrion, Division Director, Directorate for Computer & Information Science and Engineering, Division of Experimental and Integrative Activities, Room 1160, telephone: 703-292-8980, e-mail: wadrion@nsf.gov.
- Erik Nilsen, Ecological and Evolutionary Physiology, Program Director, Division of Integrative Biology and Neuroscience, Room 685, telephone: 703-292-7886, e-mail: enilsen@nsf.gov.
- Patrick Dennis, Microbial Genetics, Program Director, Division of Molecular and Cellular Biosciences, Room 655, telephone: 703-292-8443, e-mail: pdennis@nsf.gov.

For questions related to the use of FastLane, contact:

- Ms. Elaine Washington, FastLane Liaison, Division of Environmental Biology, Room 635, telephone: 703-292-7193, e-mail: biofl@nsf.gov.

The NSF website (www.nsf.gov) maintains up-to-date telephone numbers and e-mail addresses for program officers and staff in the organizational units listed above.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

The Systematic Biology Program and other units of NSF continue to support high-quality phylogenetic research, as well as development of tools and methods in computational phylogenetics and phyloinformatics, as part of a broad portfolio of research. The multi-investigator, multi-disciplinary approach for Assembling the Tree of Life is intended to achieve economies of scale beyond the reach of individual investigators or small teams supported by regular grants, and to compress the time frame for constructing a universal Tree of Life for all organisms.

Other programs and special competitions potentially relevant to research in phylogenetics include the following.

Biological Databases and Informatics (NSF 99-91), in the Division of Biological Infrastructure. The program supports research and development on new approaches to the management of biological knowledge that render the collection, maintenance, dissemination, and query of the data and information therein of greater utility to the scientific community.

Information Technology Research (ITR) (NSF 01-149), an NSF-wide activity. The program in its third year (FY 2002) emphasizes research and education in multidisciplinary areas, focusing on emerging opportunities at the interfaces between information technology and other domain-specific disciplines.

Joint DMS/NIGMS Initiative to Support Research Grants in the Area of Mathematical Biology (NSF 01-128), managed in the Division of Mathematical Sciences. The program supports research on mathematical and statistical problems related to biological research; a direct relationship between a biological application and the mathematics is expected. Research teams, which include scientists from both the life sciences community and the mathematical sciences community, are encouraged.

Human Origins (HOMINID) Moving in New Directions (NSF 01-120), managed in the Division of Behavioral and Cognitive Sciences. The competition supports large scale, long term integrative research and infrastructure projects directed towards the complex interrelationships that led to the development of our species and that are responsible for the shared and variable features characterizing human populations. One goal of the competition is to develop a portfolio of awards that reflect the multiple approaches to understanding human origins.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

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, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058.