

Assembling the Tree of Life (ATOL)

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

Program Solicitation

NSF 03-536

Replaces Document NSF 02-074



National Science Foundation

Directorate for Biological Sciences

Directorate for Geosciences

Directorate for Social, Behavioral, and Economic Sciences

Directorate for Computer and Information Science and Engineering

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

May 05, 2003

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Assembling the Tree of Life (ATOL)

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

Synopsis of Program:

A flood of new information, from whole-genome sequences to detailed structural information 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 usually concentrating on phylogenetic groups of modest size. 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 announces its intention to continue support of 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):

- Charles Lydeard, Program Director/Chair AToL Working Group, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-7142, fax: (703) 292-9064, email: clydeard@nsf.gov
- Mark A. Farmer, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N,

telephone: (703) 292-8470, fax: (703) 292-9063, email: mfarmer@nsf.gov

- James E. Rodman, Program Director, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-8481, fax: (703) 292-9064, email: jrodman@nsf.gov
- Matthew D. Kane, Program Director, Directorate for Biological Sciences, Division of Molecular & Cellular Biosciences, 655 S, telephone: (703) 292-7186, fax: (703) 292-9061, email: mkane@nsf.gov
- Judith E. Plesset, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8417, fax: (703) 292-9153, email: jplesset@nsf.gov
- H. Richard Lane, Program Director, Directorate for Geosciences, Division of Earth Sciences, 785 S, telephone: (703) 292-8551, email: hlane@nsf.gov
- Mark L. Weiss, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, 995 N, telephone: (703) 292-7321, fax: (703) 292-9068, email: mweiss@nsf.gov
- Mitra Basu, Program Director, Directorate for Computer & Information Science & Engineering, Division of Computing and Communication Foundations, 1112 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: mbasu@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:** None Specified.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 3 to 6 - awards anticipated in Fiscal Years 2005 and again in 2006
- **Anticipated Funding Amount:** \$29,000,000 is anticipated (\$14,000,000 in FY 2005 and \$15,000,000 in FY 2006), 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

- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this 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. Due Dates

- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
May 05, 2003

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

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 everbranching 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. 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, 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. 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. 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. Recent workshops supported by the NSF identify strategies for achieving the Tree of Life goals over the next 10-15 years. There are 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, morphological, and physiological evidence on extant and extinct organisms in order to resolve phylogenetic relationships of large branches of the Tree of Life;
2. Research 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; 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; and
3. Outreach and education in comparative phylogenetic biology and paleontology, emphasizing new training activities, informal science education, and Internet resources and dissemination.

For examples of successful proposals for meeting these goals, the awards for the Assembling the Tree of Life program can be accessed at <http://www.nsf.gov/bio/award.htm>.

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 organizations, 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 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://fastlane.nsf.gov/>);
- 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.

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. 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 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

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. Three to six awards are anticipated both in FY 2005 and FY 2006, made as standard or continuing grants, from the anticipated \$14M in FY 2005 and \$15M in FY 2006 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

Full Proposal Instructions:

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 Website at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

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 03-2, 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 advisor 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)

Proposers are reminded to identify the program announcement/solicitation number (03-536) 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:

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

C. Due Dates

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

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

May 05, 2003

D. FastLane Requirements

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

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. 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 National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). 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 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 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.

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 Ad Hoc 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers 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 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 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 Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 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 Website 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 Website 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. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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. 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 this program should be made to:

- Charles Lydeard, Program Director/Chair AToL Working Group, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-7142, fax: (703) 292-9064, email: clydeard@nsf.gov

- Mark A. Farmer, Program Director, Directorate for Biological Sciences, Division of Biological Infrastructure, 615 N, telephone: (703) 292-8470, fax: (703) 292-9063, email: mfarmer@nsf.gov
- James E. Rodman, Program Director, Directorate for Biological Sciences, Division of Environmental Biology, 635 N, telephone: (703) 292-8481, fax: (703) 292-9064, email: jrodman@nsf.gov
- Matthew D. Kane, Program Director, Directorate for Biological Sciences, Division of Molecular & Cellular Biosciences, 655 S, telephone: (703) 292-7186, fax: (703) 292-9061, email: mkane@nsf.gov
- Judith E. Plesset, Program Director, Directorate for Biological Sciences, Division of Integrative Organismal Biology, 685 S, telephone: (703) 292-8417, fax: (703) 292-9153, email: jplesset@nsf.gov
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- Mark L. Weiss, Program Director/Cluster Coordinator, Directorate for Social, Behavioral & Economic Sciences, Division of Behavioral and Cognitive Sciences, 995 N, telephone: (703) 292-7321, fax: (703) 292-9068, email: mweiss@nsf.gov
- Mitra Basu, Program Director, Directorate for Computer & Information Science & Engineering, Division of Computing and Communication Foundations, 1112 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: mbasu@nsf.gov

For questions related to the use of FastLane, contact:

- BIO FastLane Experts, email: biofl@nsf.gov

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 Website 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 within the Systematic Biology and Biodiversity Inventories Cluster in the Division of Environmental Biology continues 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 Systematic Biology 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.

Biodiversity Surveys and Inventories Program, within the Systematic Biology and Biodiversity Inventories Cluster, supports collecting, identifying, vouchering, and describing the species-level diversity of all forms of life on Earth, from microbes to mammals, including expeditionary work to document biotic diversity in poorly known terrestrial, freshwater, and marine environments. Supported surveys may be primarily area-based (focusing on species inventory and new species discovery, plus in some cases ecological, biogeographic, and/or evolutionary hypothesis testing), primarily clade-based (continental-scale to global species inventory and discovery within a particular taxonomic group), or primarily guild-based (surveys that couple species inventory and discovery with macroecological, historical biogeographic, and/or macroevolutionary hypothesis testing).

Revisionary Syntheses in Systematics (REVSYS), in the Systematic Biology and Biodiversity Inventories Cluster. Seeks to revitalize revisionary and monographic research on species so that it fully utilizes modern information technology at all stages of the taxonomic enterprise from data capture and analysis to electronic dissemination of results. Proposals are submitted for regular target dates in the Division of Environmental Biology.

Partnerships for Enhancing Expertise in Taxonomy (PEET), in the Division of Environmental Biology. Biennial special competition to address three biodiversity-related goals: monographic research on poorly known groups of organisms; training of at least two new taxonomic experts; and web-based bioinformatics for taxonomic resources. The deadline in March of odd-numbered years precedes panel review in late spring.

Biological Research Collections (BRC), in the Division of Biological Infrastructure. Provides support for biological collections enhancement, computerization of specimen-related data, research to develop better methods for specimen curation and collection management, and activities such as symposia and workshops to investigate support and management of biological collections.

Biological Databases and Informatics, 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.

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.

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