Genomic Resources: Bacterial Artificial Chromosome Library Construction (BAC)

*Program Solicitation*

*NSF 01-145*

DIRECTORATE FOR BIOLOGICAL SCIENCES
DIVISION OF INTEGRATIVE BIOLOGY AND NEUROSCIENCES

FULL PROPOSAL DEADLINE(S): December 3, 2001

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GENERAL INFORMATION

Program Title: Genomic Resources: Bacterial Artificial Chromosome Library Construction (BAC)

Synopsis of Program: The Directorate for Biological Sciences (BIO) invites proposals for the construction and arraying of Bacterial Artificial Chromosome (BAC) libraries, from a broad phylogenetic spectrum of organisms, for the purpose of addressing fundamental questions in developmental, evolutionary and comparative biology. Awards will be made to support the constructing and arraying of libraries, and the maintaining, archiving and disseminating of these libraries. The organisms selected should be justified in terms of their utility in addressing specific scientific questions, their phylogenetic significance, and their tractability for further studies.

Cognizant Program Officer(s):

- Judith Plesset, Developmental Biology, Program Officer, Biological Sciences, Integrative Biology and Neuroscience, Room 685, telephone: 703-292-8420, e-mail: jpleset@nsf.gov.

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

- 47.074 --- Biological Sciences

ELIGIBILITY INFORMATION

- Organization Limit: None
- PI Eligibility Limit: None
- Limit on Number of Proposals: None

AWARD INFORMATION

- Anticipated Type of Award: Cooperative Agreement, Standard or Continuing Grants
- Estimated Number of Awards: 5-10 awards, depending on award amounts with duration up to 3 years.
- Anticipated Funding Amount: $6-$10 million total, subject to the availability of funds.
PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposals**: Deviations From Standard Preparation Guidelines
  - The program announcement/solicitation contains deviations from 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**: Other budgetary limitations apply. Please see the full program announcement/solicitation for further information.

C. Deadline/Target Dates

- **Letters of Intent (optional)**: None
- **Preliminary Proposals (optional)**: None
- **Full Proposal Deadline Date(s)**: December 3, 2001

D. FastLane Requirements

- **FastLane Submission**: Required
- **FastLane Contact(s)**:
  - Maya Anderson, Program Technology Analyst, Biological Sciences, Integrative Biology and Neuroscience, Room 685, telephone: 703-292-8420, e-mail: biofl@nsf.gov.

PROPOSAL REVIEW INFORMATION

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

AWARD ADMINISTRATION INFORMATION

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

The Directorate for Biological Sciences (BIO) of the National Science Foundation (NSF) invites proposals for the construction and arraying of up to 100 Bacterial Artificial Chromosomes (BAC) libraries derived from phylogenetically diverse taxa. These BAC libraries can be used to address fundamental questions in developmental, evolutionary, and comparative biology. Examples include, but are not limited to: How have changes in gene regulation caused major evolutionary transitions? Do gene families of transcription factors or signaling molecules work differently across the phylogenetic tree? How have genes been co-opted for unique functions? How significant has gene co-option been in evolution and how has this process occurred? What changes in genome structure and function enabled the transition to multicellularity? How have alterations in gene structure affected morphological transitions? How has evolutionary history driven or constrained ontogeny? And how have developmental constraints affected evolution? How have polyphenism, polymorphism, and mimicry arisen? What mechanisms account for co-evolution on a genomic level?

This BAC resource will be of special importance to the evolution of development and phylogenetics research communities, where a comparative approach is a necessity, but would also be of general value to researchers in any field of biology pursuing research from a comparative or evolutionary perspective.

II. PROGRAM DESCRIPTION

Proposals are solicited for projects to create arrayed BAC library resources from a phylogenetically broad spectrum of organisms for the purpose of addressing questions of fundamental significance in the fields of comparative, evolutionary, developmental, or other relevant areas of biology. It is anticipated that awards will be supported for up to three years to construct, archive and disseminate up to thirty arrayed BAC libraries per award (with a minimum genome coverage of 5X) that can be used to address specific comparative or evolutionary questions. We encourage groups of investigators to collaborate to submit multi-taxon proposals; however, single taxon proposals will also be considered.

A. BAC Library Construction and Distribution

(1) BAC Library Construction
Each proposal for BAC library construction must include the following information:

- Methodology for library preparation: Each proposal should include a description of how the DNA will be isolated and how the insert will be prepared with a justification of the restriction enzyme(s) to be employed. Libraries are anticipated to be in the range of 5-10 X genomic coverage with an average insert size of at least 100kb. The depth of coverage of the library should be justified with respect to the proposed scientific questions and the characteristics of the proposed genomes. Every effort should be made to obtain libraries with less than 5% organellar contamination or empty vectors. Proposals should provide some discussion of contingency plans should the taxa chosen prove refractory to isolation of the high molecular weight DNA necessary for BAC library construction. Preliminary data supporting the DNA isolation method and enzymes chosen for each organism will be advantageous. Library preparation may be subcontracted out, if appropriate. If the DNA preparation and library construction are to be carried out at different locations, details of what will be transferred and the method of transfer should be included. Proposers are encouraged to include technical advisors for BAC library preparation, where appropriate. Letters of support from these advisors should be included in the Supplementary Documents section of the proposal.

- Justification of taxa: Each proposal should justify the taxa selected, including identifying the scientific questions to be addressed, the phylogenetic significance, and the tractability of the organisms selected. While the aim of the Program is to obtain libraries from species with broad representation over the eukaryotic Tree of Life, pairs of closely related species or small sets of related taxa will also be considered if their choice is well justified with respect to appropriate distance for comparative studies or scientific question to be addressed. All materials used for library preparation must be derived from a documented source. The vouchering of specimens is required.

- Scientific synergies: Each proposal should address the potential value of the BAC libraries. Include descriptions of any discussions with the broader scientific community participating in the Program about coordinating of the selection of taxa for library construction.

- Role of participants: Each proposal should address how each member of the team will contribute to the goals of the project. If cross-disciplinary researchers will participate, what expertise will each bring to the project?

- Timetable: Each proposal must include a timetable, with milestones for all project goals. Roles of the PI, co-PIs, and any subawardees involved should be specified.
(2) Library maintenance and distribution

Each proposal must contain plans for archiving and dissemination of the BAC libraries produced. All libraries and clones shall be available to all requestors without restrictions on their use. Projects may either distribute their own libraries or make arrangements for distribution through a third party. An existing facility may be used for this purpose. If so, a letter of support from the facility must be included. Projects may accept and disseminate BAC libraries from other sources. If a third party BAC distribution is proposed, clear plans for quality control, including verification of the library source, insert size, and genomic coverage must be discussed in addition to the issues indicated above.

Mechanisms to ensure quality control are essential and must be addressed. These should include, but are not limited to, bar-coding, sequence verification, and sample tracking. Detailed plans and the estimated costs for these activities must be included. If these resources are pre-existing they should be described in detail. Inclusion of information about the track record of the distributor is encouraged. If a new facility is to be established, the organization of the components should be carefully described.

Proposals should include an estimation of distribution capacity and recharge costs. A fee may be charged to recover the cost of clone or library distribution, but the basis for these should be described in the proposal. Long-term distribution plans should also include a discussion of the anticipated demand for the resources, a timetable for library resurrection and duplication, and plans for maintenance of back-up library copies. Proposals must indicate how these resources will be advertised and made available to the community. This must include a plan for maintaining such community availability, without additional NSF support, for a period of five years beyond the period of the grant.

(3) Informatics and Database Activities

All proposals must include a description of resources for the necessary informatics and database activities. See below for information about a post award informatics and database coordination meeting. Proposers planning to distribute and archive libraries must indicate how these resources will be advertised and made available to the community. Links with the phyloinformatics community should be described. These plans might include meetings or workshops that are open to a broad range of participants. The time period for these plans should be indicated.

(4) Workforce Education and Training

While not all proposals will necessarily include direct opportunities for training, training opportunities should be discussed where appropriate. These may include, but are not limited to, training workshops on uses of the resources generated during the project.
B. Awardee Meeting

All Principal Investigators of funded projects will be required to attend a post-award meeting at NSF to ensure that funded groups take compatible approaches to informatics and database activities. This meeting may also serve as an opportunity for discussing the uses of the resources generated by each project. Funds to attend this meeting should be included in the travel budget for the project.

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

Awards may be in the form of Cooperative Agreements, Continuing Awards or Standard Awards. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds. The award size will depend, in part, on the number of libraries proposed, the distribution mechanism selected, and equipment requested. However, it is anticipated that awards will be made within the range of $200,000-$2,000,000 each. The awards are anticipated to be of up to three years duration. BAC library construction may be performed under subcontract but the coordination, quality control and dissemination responsibilities must be made explicit.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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.

The program announcement/solicitation contain deviations from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

Proposers are reminded to identify the program solicitation number (NSF 01-145) in the program announcement/solicitation block on the proposal Cover Sheet (NSF Form 1207). 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.

**Other Budgetary Limitations:** All Principal Investigators of funded projects will be required to attend a post-award meeting at NSF to ensure that funded groups take compatible approaches to informatics and database activities. Funds to attend this meeting should be included in the travel budget for the project.

Library preparation may be subcontracted out; if so the appropriate subcontract budgets must be included.

Proposals should include an estimation of distribution capacity and recharge cost. A fee may be charged to recover the cost of clone or library distribution, but the basis for these should be described in the proposal.

C. Deadline/Target Dates

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

**Full Proposals by 5:00 PM local time:** December 3, 2001

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](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 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](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.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal 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?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration 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.

A summary rating and accompanying narrative will be completed and signed 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.

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 and/or panel review.

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

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 70 percent of proposals. The time interval begins on the date of receipt. 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 its 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.


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.

All Principal Investigators of funded projects will be required to attend a post-award meeting at NSF to ensure that funded groups take compatible approaches to informatics and database activities.
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 Genomic Resources: Bacterial Artificial Chromosome Library Construction should be made to:

- Judith Plesset, Developmental Biology, Program Officer, Biological Sciences, Integrative Biology and Neuroscience, Room 685, telephone: 703-292-8420, e-mail: jpleset@nsf.gov.

For questions related to the use of FastLane, contact:

- Maya Anderson, Program Technology Analyst, Biological Sciences, Integrative Biology and Neuroscience, Room 685, telephone: 703-292-8420, e-mail: 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 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.
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 (FASED) 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, Information Dissemination Branch, 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.

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