

Announcement of the AFGN Program (Funding Period 2007 – 2010)

1. Introduction

The *Arabidopsis* Functional Genomics Network (AFGN) started in 2001 as a basic research program by a bottom-up approach of the German *Arabidopsis* research community (<http://www.uni-tuebingen.de/plantphys/AFGN/index.html>). AFGN has been organized in close cooperation with the United States National Science Foundation (NSF) 2010 Project to determine the functions of all genes in the model plant *Arabidopsis thaliana* by the year 2010. The cooperation included a joint workshop (2002), the initiation of the Young Researcher Exchange Program (on-going), and a pilot data integration project (ongoing). In addition, AFGN has initiated the worldwide largest and internationally cooperative *Arabidopsis* transcriptome project: AtGenExpress. The AtGenExpress data represent the experimental base for many open access bioinformatics sources.

In 2004, DFG and NSF organized a coordinated review process of proposals submitted to the AFGN program and the 2010 Project, respectively. The main activities of the ongoing research projects of the second funding period concentrate on the analysis of members of selected *Arabidopsis* multiprotein families.

The DFG announces its intention to continue support of the German *Arabidopsis* functional genomics research and German/US bilateral science cooperation in the framework of AFGN. Individual investigators or groups of investigators will be supported to conduct creative and innovative, genome-wide or systems-level research designed to determine, using all available means, the functions of *Arabidopsis* genes. Proposals submitted in response to this Announcement will be reviewed jointly with proposals submitted to the 2010 Project of the NSF (<http://www.nsf.gov/pubs/2006/nsf06612/nsf06612.htm>). Both NSF and DFG encourage, but do not require, submission of joint research proposals when German and US scientists are collaborating on a project. For the collaborative activities, German and US researchers are supported by DFG and NSF, respectively, and no co-mingling of funds is involved. Special instructions are provided below in the guidelines for submitting joint research proposals.

2. Future Research Direction of AFGN

The AFGN program will continue to support basic functional genomics research in *Arabidopsis thaliana*, thereby contributing to accelerated acquisition and utilization of new knowledge and innovative approaches to elucidate fundamental biological processes in higher plants. Based on feedback from the community of AFGN researchers integrated by the AFGN Steering Committee, areas of research were identified of which support should concentrate on within the next funding period:

Functional Genomics of Biological Processes

Recent AFGN research has shown unequivocally that different members of a given *Arabidopsis* multiprotein family may be multifunctional and, thus, may act in distinct biological processes and pathways. As a consequence, the focus of AFGN will move from a sole multiprotein family-based genomic approach towards the genomic analysis of multigene networks whose members functionally interact with each other in accomplishing a given biological process. Such a network may consist of members of the same or of different *Arabidopsis* multiprotein families. Projects aimed to a deeper understanding of the molecular and functional interplay of such gene networks should be developed on the basis of defined biological processes or pathways in *Arabidopsis* and be built on solid existing work with well-characterised sets of genes or gene families.

Tools and Resources for Plant Functional Genomic Research

There is still demand for the development of novel and, especially, quantitative genome-wide tools and technologies (e.g. in cell imaging, protein modification and intracellular localisation, protein-protein interaction, metabolomics, ionomics, bioinformatics), and additional resources in plant functional genomics to address unmet needs (e.g. conditional expression collections of *Arabidopsis* for the characterisation genes with yet unknown function, intracellular protein localisation and protein-protein interaction databases).

3. Program Description for AFGN (2007-2010)

Both AFGN and 2010 Project share the same goal, and common topics have been identified for future support by the 2010 Project, e.g. during the 2005 mid-term workshop of the North American *Arabidopsis* Steering Committee, and by the AFGN community (see above). In order to facilitate joint proposals between German and US researchers as well as the joint review process, DFG and NSF decided for tightly linked program announcements with a shared set of focus areas for AFGN and 2010 Project, respectively.

The third funding period of the AFGN program (October 2007 – September 2010) will focus on the following main activities which are in agreement with the FY 2007 solicitation for the 2010 Project by the NSF.

Developing genome-wide experimental approaches and tools for analyzing gene function and regulation

AFGN and the 2010 Project will continue to support development of novel experimental methods/techniques and research tools, including biological resources and informatics tools. It is expected that these methods and tools will complement the already existing tools and research resources, will provide quantitative readouts, are cost effective and comprehensive, and can be readily adopted by the scientific community. Special attention should be paid to methods and tools that will enable genome-wide functional analysis of genes of unknown function and classes of genes that have been underrepresented up to this point (e.g. non-protein coding RNAs). Large production-scale projects using proven technologies as well as pilot projects to demonstrate feasibility of novel methods and technologies will be considered. AFGN project proposals aiming to develop novel approaches, tools and resources must focus on a specific problem or need within a defined biological context, and should be justified in terms of potential demand and efficiency.

Exploring exemplary networks and systems

Efforts to determine the function of a network of genes will be supported in the third AFGN funding period, with an emphasis on research on exemplary gene networks and processes. Many *Arabidopsis* genes and their products function as nodes in overlapping, dynamic biological processes. Determining the gene circuitry underlying a given biological process is essential in the understanding of *Arabidopsis*, especially at systems level. The objective of this activity is to identify and characterize representative gene networks covering regulatory principles, physiological and metabolic adjustments which are involved in major biological processes in plants, including development and the interaction with the abiotic and biotic environment as well as to analyse meta-networks connecting these processes. Such projects are expected to include protein-coding genes, genes for functional non-protein coding RNAs, or both.

4. Additional Considerations

Participation: Participation of investigators and institutions that have not been involved in the previously funded AFGN activities is encouraged. New proposals that focus on *per se* analysis of gene families are not appropriate for AFGN proposals in 2007. However, the continuation of proposals for projects that have been started within the second AFGN funding period (2004-2007) will be considered if well justified on the basis of the overall goal of AFGN and the 2010 Project as described above.

Although the areas listed above reflect the focus of the 2007 AFGN Announcement, all imaginative and innovative proposals will be considered as long as they are justified on the basis of the overall goal of AFGN and the 2010 Project as described above.

Sharing of the project outcome: Success of AFGN and the 2010 Project will be ultimately measured by the extent to which its research results and products (data, information, research tools, biological resources and human resources) have a major impact to the advances in our understanding of the function of genes in *Arabidopsis*. One way to ensure success is to make the outcomes of the AFGN Projects available openly, widely, rapidly, and in an easily accessible manner. The DFG expects biological materials resulting from AFGN projects to be deposited at an established public depository (i.e. the Nottingham *Arabidopsis* Stock Centre-NASC, or The *Arabidopsis* Biological Resources Center-ABRC). In terms of

information and data, DFG and NSF expect them to be made available through an established public database (i.e., the *Arabidopsis* Information Resources-TAIR, NCBI databases, etc.), in addition to the project website. ABRC and TAIR are supported by NSF and they are expected to assist researchers in determining the most efficient and least cumbersome ways to make biological and data resources available to the public.

International collaboration (2010 project and beyond): The DFG encourages laboratory-to-laboratory interactions between AFGN and foreign laboratories whenever such opportunities exist. AFGN Project funds may be requested to support foreign investigators to work in German laboratories and for German investigators and PhD students to work in international laboratories. However, foreign counterparts should secure support for their projects from their own national programs. A list of *Arabidopsis* functional genomics projects in other countries can be found at http://www.arabidopsis.org/info/2010_projects/index.jsp. Details of the Young Researcher Exchange Program between AFGN and US laboratories are available at: <http://www.uni-tuebingen.de/plantphys/AFGN/yrep.htm>.

Coordination among projects: For efficient coordination the proposers are strongly encouraged to consult the scope of previous AFGN (<http://www.uni-tuebingen.de/plantphys/AFGN>) and NSF 2010 awards (<http://www.nsf.gov/bio/pubs/awards/2010awards.htm>) as well as similar functional genomics programs in other countries (http://www.arabidopsis.org/info/2010_projects/index.jsp), e.g. GARNET, the genomic *Arabidopsis* Resource Network in the U.K. (<http://www.york.ac.uk/res/garnet/garnet.htm>). Proposers are further encouraged to coordinate proposed activities with funded projects prior to submission of new proposals. If activities similar to an already funded project are to be proposed, the PI should provide a plan for coordinating activities with the funded project.

Intellectual property: When the project involves the use of proprietary data or materials, any data or materials resulting from DFG-funded research must be made promptly available, without any restrictions, to the users of such data or materials.

Industrial interactions: DFG recognizes that some of the resources and technologies needed to address the next set of challenges in *Arabidopsis* functional genomics exist in industry and encourages the use of their services if it would result in cost-savings and more rapid progress of the project. Such arrangements would usually involve purchase of resources or services from industry, and must be made without any restrictions on sharing the research outcomes with other researchers or on depositing information and physical resources in public repositories and databases, respectively. Another mode of industrial interactions may involve equal partnerships between academia and industry. Under such an arrangement, DFG funds may not be used to support the industrial collaborators. Both parties are expected to bring their own resources to the project and share the results openly and quickly with the rest of the community.

5. Proposal Submission

Proposals are invited from single investigators or small groups. Joint proposals with US researchers are a welcome but not required for the application.

AFGN grant proposals (in English) are to be sent to the DFG (Dr. Katrin Hahlen/ Dr. Roswitha Schönwitz, DFG, 53170 Bonn, Germany) by **January 29, 2007**. The AFGN proposals and the 2010 Project proposals submitted to the NSF will be jointly reviewed by an international group of referees in April or May 2007. Funding decisions are anticipated by the beginning of September 2007 at the earliest; projects could potentially start immediately thereafter.

Proposals submitted in response to this AFGN program announcement must be prepared and submitted in accordance with the general guidelines contained in the DFG *Proposal Guidelines for Research Grants*, available electronically on the DFG Website at: http://www.dfg.de/forschungsfoerderung/formulare/download/1_02e.pdf

Proposals must include a CV and a complete list of scientific publications of the previous five years for the PI/ Co-PIs.

The following **additions or modifications** apply to proposals submitted in response to the AFGN announcement:

Project Summary

The project summary should include both scientific goals and the expected impacts of the proposed research project on the research infrastructure and research networks of the community of *Arabidopsis* researchers and more widely, the plant science community in general.

Project Description

(Sections II.2. and II.3. of the DFG Proposal Guidelines; should not exceed 15 pages including figures and tables):

- **Relevant Results from Prior DFG Support/ Other Own Preliminary Work (section II.2.2.):** If the PI or any of the Co-PIs has had an AFGN award, dissemination of the outcomes from the prior award must be described in this section.
- **Justification:** Briefly explain how the proposed activities meet the goals of the AFGN.
- **Research Plan:** Describe the goals of the project, scientific and technical approaches, including informatics where appropriate, with expected outcomes. Descriptions must be sufficiently detailed to allow adequate review. All projects are expected to contain information about how the investigators plan to add their results to the community-wide effort to update and add value to the primary sequence information in GenBank as well as a projected timetable for accomplishing the stated proposal goals. If research tools and resources such as mutants and global expression data are produced during the course of the proposed project, the proposal should describe a plan for their public release and coordination with the existing distribution mechanisms. DFG expects biological materials resulting from AFGN projects to be deposited at an established public depository (i.e. NASC). In terms of information and data, DFG expects them to be made available through an established public database (i.e., the *Arabidopsis* Information Resources, NCBI databases, etc.), in addition to the project website (see the supplemental information A-4, below).
When the generation of large data sets within a genome-wide project is proposed, the investigator(s) should convincingly describe the strategy of how a high quality of (quantitative) measurements and the reproducibility of the collected data are to be ascertained. For proposals aimed at developing research methods, tools, and resources for the *Arabidopsis* functional genomics community, the following information should be included: (1) a list of deliverables including necessary informatics tools; (2) experimental plans to develop the methods/resources/tools including mechanisms of quality assessment; (3) project timetable; (4) a detailed plan for public release of the resources/tools; (5) any conditions to be placed on users, e.g. material transfer agreement, if any; (6) a plan to maintain and distribute the resource after DFG support has ended. It should be noted that resources (biological materials, software, etc.) produced with the support of DFG in all AFGN projects must be made available as soon as their quality is checked to satisfy the specifications described in the proposal and approved by reviewers. Further, they must be made available to all segments of the scientific community.

Proposal Budget (Section II.4.)

A Budget Justification should be provided in the context of the scale of the proposed activities. For all joint US-German collaborative activities, requested funds have to be listed separately for the AFGN and the 2010 sub-projects, respectively (see below).

Resources Available for the Project (Section II.5.)

Other sources of research support to the PI for studies related to the proposed activity, especially if not provided by the DFG, must be clearly identified, e.g. GABI or European research networks. Applicants must guarantee that all information, resources and results obtained in the AFGN project are freely available for international cooperation and that this is not in conflict with obligations of the PI(s) in other projects.

Special Information and Supplementary Documentation

Include the following materials, if applicable:

(A-1) Data Management Plan (maximum 1 page): Development and adherence to community-wide standards for collection and presentation of data, such as microarray or interactome data, are highly encouraged. Large-scale datasets must be made available in a format that enables rapid comparison and effective utilization of reproducible information. All proposals must include a detailed data management plan if the project is expected to generate significant digital data for preservation (maximum 1 page). The contents of the data management plan should include:

- The types of data to be produced
- The standards that would be applied for format, metadata content, etc.
- Provisions for archiving and preservation
- Access policies and provisions
- Plans for eventual transition or termination of the data collection after the DFG funding period

(A-2) Project Management Plan (maximum 2 pages):

Each proposal involving 4 or more PIs (1 PI and 3 Co-PIs) OR with PIs/Co-PIs from 3 or more different institutions, OR proposing to develop community research tools and resources must provide an additional description of the management plan for coordinating activities of the group or the management of the service aspect. This description should include plans for internal means of communication, coordinating data and information management, evaluating and assessing progress, allocating funds and personnel, interacting with users in a service project, and other relevant issues specific to the proposed activities. The overall project leader (normally the PI) must be identified and his/her role should be described. Change of project leader will require prior DFG approval. The exact time commitment of each key member to the project should be indicated in the management plan. A project timetable with yearly goals should be included for all projects, regardless of the number of personnel involved.

(A-3) Coordination with Outside Groups (maximum 3 pages): If the proposed activity is part of a national or international collaborative project, describe the relationship of the proposed activity to the overall collaborative project and how the components will be coordinated. If a project similar to the proposed project (e.g., either addressing the same exemplary network of genes or producing the same kind of community resources) is already supported elsewhere, a coordination plan is mandatory.

(A-4) Project Web Site: All AFGN Projects are required to have a web site specific for disseminating information about the scope and progress of the project. Describe a plan to develop and update the project website, including the timetable for development and the personnel involved. The project website should be open to public, and preferably, non-password protected. If any of it is password protected, the condition for granting access must be clearly stated on the first page. The web page should be specific to your AFGN project, should be user friendly, and should contain the following information at the least:

- A list of identifiers for the genes included in your project, if applicable.
- Project abstract
- Project participants
- Progress in identifying the functions of the genes under study-updated on a regular basis
- Outcomes: Publications, resources generated in the project and their availability (e.g. homozygous mutants generated in the project and their availability in NASC), data generated in the project and its availability (e.g. microarray datasets generated in the project and their availability in TAIR, NCBI or on your project website), tools generated in the project and their availability (e.g. new computational tools and where to download them).

"Conflict of Interest" List: This document must be in the form of a **single alphabetized table** that includes full names of all conflicts of interest for all senior personnel (PI and Co-PIs) as well as for any named personnel whose salary is requested in the project budget. Conflicts to be identified are (1) PhD thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, and (3) any other individuals or institutions with which the investigator has financial ties (please specify type).

Reviewers: An alphabetized **list of suggested reviewers** can be submitted.

Submission of Joint US-German Collaborative Research Proposals:

If a joint proposal for consideration by AFGN and 2010 is being submitted, the following procedure must be followed:

- German Principal Investigators must submit their complete proposal to DFG, following the AFGN proposal preparation instructions above. Please note that the Project Description (encompassing sections II.2. and II.3. of the Proposal Guidelines) may not exceed 15 pages in order to be compatible with the requirements for 2010 proposals.
- The title should begin with "2010/AFGN Collaborative Project:.....".
- The US Principal Investigator will submit the joint proposal to NSF through the FastLane system, following the guidelines for FY2007 NSF 2010 Project proposals, available electronically on the NSF Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>. The text that describes the proposed project and related activities must be identical in both proposals. This proposal must include information specific to the German collaborators in the supplemental document section of FastLane [Appendix 5 (A-5)]. The additional information required under (A-5) includes:
 - (a) information required in section II.2.2. (results from prior DFG support/ other preliminary work), II.4. (proposal budget), II.5. (resources available for the project) and II.6.1. (Declaration) of the DFG Proposal Guidelines
 - (b) CV and complete list of scientific publications of the previous five years for the German PI/ Co-PIs

Please keep in mind, that while 2010 grants can be awarded for up to 4 years, DFG funding can be granted for up to 3 years (36 months) only. Any elongation of a project will require a continuation proposal.

Proposals that are not compliant with the guidelines may be returned without review.