

## IDEAS LAB

### Nitrogen: Improving on Nature

#### A Joint BBSRC and NSF Activity

3<sup>rd</sup> – 7<sup>th</sup> December 2012  
Crewe Hall, Crewe (UK)

**Closing date for applications: 4pm, Submitter's Local Time\*, 7 September 2012**

(\*NB Washington DC is on EDT, which will be five hours behind the UK on 7 September)

#### **The Challenge**

Nitrogen is critical to plant growth. A limited number of plant species have the capacity to fix atmospheric nitrogen through symbioses with nitrogen fixing bacteria; the rest need to obtain their nitrogen through soluble compounds in soil. For the majority of crop plants, nitrogen availability has been increased through the use of nitrogen-based fertilizers. However, application of artificial fertilizers is costly and is limited in developing countries, where the cost and lack of infrastructure are barriers. The process by which these fertilizers are produced is energy-intensive and contributes to greenhouse gas emissions. Further, much of the nitrogen applied to agricultural land through fertilizers is not used by the crop and is lost as run-off into water courses or as greenhouse gases through denitrification, resulting in deleterious impacts on the environment.

The ultimate aim of this Ideas Lab between the Biotechnology and Biological Sciences Research Council (BBSRC) in the UK and the National Science Foundation (NSF) in the US is to help meet the challenge of sustainably producing enough food for a growing population whilst reducing pollution and greenhouse gas emissions.

The key objective of this joint activity is to stimulate innovative and transformative research proposals that will reduce inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield. This could be achieved by: i) giving crops the ability to fix their own nitrogen; ii) significantly increasing the nitrogen available to roots by manipulating the rhizosphere; or iii) significantly improving the crop's nitrogen use efficiency. Other approaches are also welcome (noting that precision agriculture is excluded from this call). Proposals must include ideas that could lead to a step-change in our knowledge, rather than incremental advances. The proposals will be generated by multidisciplinary teams which in addition to scientists from a traditional biology background, may include researchers with expertise in physics, chemistry, engineering, mathematical modelling, computer science or any other discipline which may help to shed light on the topic. Researchers with expertise in areas of bioscience including soil science, nitrogen fixation, nitrogen metabolism and resource partitioning in plants will be required. Given the likely complexity of the research required, specialists in other areas of bioscience including but not limited to bioenergetics, metabolic engineering, synthetic biology, modelling, and systems biology are also strongly encouraged to participate.

The aspiration is that mixing researchers from diverse scientific backgrounds will engender fresh thinking and new approaches that can be used to increase nitrogen availability to crop plants whilst maintaining or increasing yield, and hence decrease the need for the application of fertilizer. In addition, by bringing together the best researchers from the US and the UK, the intention is to form strong transatlantic alliances, where the resulting synergies from the expertise of each partner allow for significant added value.

## Call for Participants

We are now inviting expressions of interest to take part in a five-day Ideas Lab to develop innovative and transformative ways to reduce inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield, through a multidisciplinary approach. The Ideas Lab will develop outline proposals that will subsequently be developed into full proposals and submitted for consideration by the funding agencies and a team of mentors. Successful proposals developed through the Ideas Lab will be jointly funded by BBSRC and NSF, and up to **\$12M** (\$6M or equivalent each from the US and the UK) is available subject to proposals.

NSF is also holding a separate call for eligible US applicants who do not wish to participate in the Ideas Lab but would still like to apply (see [http://www.nsf.gov/funding/pgm\\_list.jsp?org=NSF&ord=rcnt](http://www.nsf.gov/funding/pgm_list.jsp?org=NSF&ord=rcnt)).

UK researchers from eligible institutions who do not wish to participate in the Ideas Lab but would like to apply for BBSRC funding in this area can submit an application at any time through responsive mode (see <http://www.bbsrc.ac.uk/funding/apply/deadlines.aspx>).

## Introduction

The Biotechnology and Biosciences Sciences Research Council in the UK (BBSRC) and the National Science Foundation (NSF) in the US invite expressions of interest to participate in an interactive workshop (Ideas Lab) to be held at Crewe Hall, near Crewe (UK) from 3<sup>rd</sup> to 7<sup>th</sup> December 2012.

The aim of the Ideas Lab is to stimulate thinking in promising new, or currently under-developed, areas of research which could help reduce inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield. The BBSRC and the NSF plan to allocate up to **\$12M** to support genuinely novel and potentially transformative research arising from the Ideas Lab.

Given the current state of knowledge in this area, transformative progress demands an innovative and multidisciplinary approach. Consequently, the aim of this Ideas Lab is to bring together researchers to explore new and exciting avenues for future research in this area, across a wide range of disciplines.

## The Ideas Lab

The Ideas Lab is an interactive workshop on a particular topic, in this case reducing inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield, involving up to 30 participants. It aims to stimulate thinking in promising new, or currently under-developed research areas relevant to nitrogen in crop plants, and to fund new collaborations between leading US and UK scientists, in order to advance current research practises from both nations.

Participants will be expected to engage constructively in dialogue with each other, the facilitators, and the Director and Mentors to develop collaborative research proposals. Collaboration will be encouraged, especially in bringing great minds together from across the Atlantic to embrace this challenge.

The Ideas Lab is sponsored by the BBSRC and the NSF. As such, **only those eligible to apply for funding from either BBSRC or the NSF will be eligible to apply to attend the Ideas Lab.**

The Ideas Lab will run over five days starting mid-morning on day one and finishing mid-afternoon on day five. At the outset, the participants work collaboratively to identify and define the scope of the research challenges relating to nitrogen fixation and nitrogen use efficiency. As the Ideas Lab progresses, participants will build up thoughts about how the identified challenges may be addressed and develop their innovative ideas and activities into research projects, which should contain genuinely novel and potentially risk-taking investigations. The Ideas Lab will include inputs from a variety of sources and will aim to develop collaborative research projects. Following the Ideas Lab up to **\$12M** will be allocated subject to the quality of proposals. Those selected to participate will receive further instructions prior to attending the event.

## **How will the Ideas Lab Work?**

The Ideas Lab is an intensive, interactive and free-thinking environment, where a diverse group of participants from a range of disciplines and backgrounds gets together for five days – away from their everyday worlds – to immerse themselves in collaborative thinking processes in order to construct innovative approaches.

The nature of the Ideas Lab requires a high degree of trust between participants in order to make the required breakthroughs in scientific thinking. This trust extends to allowing the free and frank exchange of scientific ideas, some being in the very early stages of development. The aim of the Ideas Lab is not to discuss ideas that are already well-developed but not yet published. Rather, the goal is to bring individuals from different disciplines together to interact and engage in free thinking on first principles, to learn from one another and create an integrated vision for future research projects. It is expected that the sharing of these ideas would be encouraged within the Ideas Lab but their confidentiality would be respected outside the Ideas Lab.

The Ideas Lab will be led by a Director whose role will be to assist in defining the topics and aid facilitated discussions at the event. The Director will be joined by a small number of Mentors. The Mentors have been selected by BBSRC and the NSF, based on their intellectual standing, their impartiality and objectivity, and their broad understanding of, and enthusiasm for, the subject area. The Director and Mentors will take full part in the Ideas Lab, and will not be eligible to receive research funding under this collaborative activity. They will therefore act as impartial peer reviewers in the process, providing a function analogous to that of an NSF review panel.

The Director will be announced in due course.

The process can be broken down into several stages:

- Defining the scope of the challenges
- Evolving common languages and terminologies amongst people from a diverse range of backgrounds and disciplines
- Sharing understandings of the challenges, and the expertise brought by the participants to the Ideas Lab
- Taking part in break-out sessions focused on the challenges, using creative thinking techniques
- Capturing the outputs in the form of highly innovative research projects
- Using “real-time” peer review to develop projects at the Ideas Lab

The Ideas Lab will be an intensive event. For the well-being of participants, the venue offers opportunities for relaxation, and the timetable will include networking and other activities as a break from the detailed technical discussions.

## Who Should Apply to Participate?

Having the right mix of participants influences the success or failure of such an event. Applications are encouraged from individuals representing diverse research areas across a range of disciplines.

Contributions to this challenge could be made by researchers working in a variety of disciplines or research areas. These will include biology, chemistry, physics, bioinformatics, computer science, mathematics, statistics, modelling and engineering. However, we are not defining the disciplines that should be represented at this Ideas Lab; rather we are asking potential participants to indicate how their expertise can address the challenge of reducing inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield.

It would be beneficial for applicants to have some prior knowledge of the challenges associated with nitrogen fixation, nitrogen availability and/or nitrogen use efficiency in plants, but more importantly applicants will need to demonstrate an enthusiasm for cross-disciplinary research, as the future of this research area will require input from many disciplines.

The ability to develop and pursue a new approach will also be crucial. Expertise is required from a very broad range of disciplines, and applicants should not feel limited by conventional perceptions: the Ideas Lab approach is about bringing people together who would not normally interact. We actively encourage people to apply who are experts in their own research areas but have not yet applied it to this challenge.

This is an opportunity to share ideas and develop future collaborations. Participants are welcomed at any stage of their research career, however they **must** be eligible to apply for funding from either BBSRC or the NSF.

## Location and Date

This Ideas Lab will take place at Crewe Hall, near Crewe (UK) from **3<sup>rd</sup> to 7<sup>th</sup> December 2012**. Further details of this venue are available at <http://www.ghotels.co.uk/hotels/crewe-hall-crewe-cheshire.aspx>. The environment will encourage free and open-minded thinking; vital for the purposes of this event.

Submission of an application will be taken to mean that the applicant is available to attend on the specified dates and will make a commitment to attend if selected. Additional details of the venue, how to get there and the accommodation arrangements will be provided to the selected participants. It should be noted that all travel to the Ideas Lab, accommodation, refreshments, breakfast, lunch and dinner costs will be met by the BBSRC and the NSF. However, all incidental costs incurred whilst at the event must be met by the participant.

## Applying to Participate in the Ideas Lab

Applications are invited from individual researchers who can contribute to the Ideas Lab and the resulting research projects. Up to **30 participants** will be identified to take part. Participants will be chosen to allow equal representation from both the UK and US. UK applicants must be eligible to apply to BBSRC for funding (rules for managed mode funding apply, see <http://www.bbsrc.ac.uk/web/FILES/Guidelines/research-grants-eligibility-overview.pdf>). US applicants must be from a US institution that is eligible to apply to NSF for funding.

**UK applicants** should follow the guidance below. US applicants should follow the guidance on the NSF site

[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504773&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504773&org=NSF&sel_org=NSF&from=fund).

Participants in the Ideas Lab will be selected on the basis of information submitted in the application form. These will be submitted to BBSRC as a word or PDF document using the following email address: [nitrogen.ideaslab@bbsrc.ac.uk](mailto:nitrogen.ideaslab@bbsrc.ac.uk).

The applications are limited to **two pages** for the main application form, two pages for the **Biographical Sketch** and one page for the **Current and Pending Support** document. Details about how to prepare the Biographical Sketch and **the Current and Pending Support** documents can be found at 'Guidance notes' in the 'Downloads' section of the BBSRC website: <http://www.bbsrc.ac.uk/funding/opportunities/2012/ideaslab-nitrogen-improving-on-nature.aspx>.

**In order to participate, applicants must be available to attend for the full five-day duration of the Ideas Lab from 3<sup>rd</sup> to 7<sup>th</sup> December 2012.**

The deadline for applications is **4:00 pm submitter's local time (UK BST) on 7<sup>th</sup> September 2012.**

No further documentation will be accepted and please note that late submissions will not be considered further. Applicants will be informed of their selection for the Ideas Lab event in due course.

### **Main Application (maximum 2 sides)**

Your answers to these questions will be used to assess your application and demonstrate that you have the suitable skills and attitude to participate in this Ideas Lab. Please note that your academic publication or research track record is relevant but not of primary interest (especially as these are covered in the biographical sketch / current and pending support sections). Of greater interest is evidence of how you might approach multidisciplinary problems in a novel area.

#### Page one (maximum 1 side):

1. Provide a brief summary of your professional background (no more than half a page).  
*(Please note that if you are selected as a participant, information under this question will be made available to other participants to facilitate networking at the event).*
2. What expertise do you bring that is relevant to realising the goal of reducing inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield? (no more than half a page).

#### Page two (maximum 1 side):

Please spend some time considering your answers to the following questions. Your responses (no more than 150 words each) should demonstrate that you have suitable skills and aptitude to participate in the Ideas Lab event (unrelated to your research track record).

3. What is your personal experience of working in teams?
4. How would you describe your ability to explain your research to non-experts?
5. The Ideas Lab environment is especially suited to individuals who are willing to step outside of their particular area of interest or expertise, who are positively driven, who

enjoy creative activity, who can think innovatively and who can settle in easily in the company of strangers. Please describe an experience you have had in a comparable environment.

6. What would you gain personally and professionally from participating in this Ideas Lab event?

## **Biographical sketch (maximum 2 sides) and Current and Pending Support (maximum 1 side)**

Guidance on how to complete these sections are provided in the 'Downloads' section of the relevant BBSRC web page.

### **Assessing Applications**

Applications to attend the Ideas Lab will be considered by BBSRC and the NSF with advice from a team of mentors. Final selection decisions regarding participation in the Ideas Lab will be made by BBSRC and the NSF.

A number of criteria will be used in the selection of participants including coverage of disciplines and expertise, and demographic and institutional spread. The following specific attributes will also be assessed:

- The ability to develop new and highly original research ideas;
- The potential to contribute to research between disciplines;
- The ability to work in a team across academia;
- The ability to explain research to non experts.

Please ensure you fully complete the main application form as described above, biographical sketch and pending and current support sections, as this is the **only** information on which potential Ideas Lab attendees will be selected. Please note that because of the large number of applications expected, BBSRC will not be able to give individual feedback to unsuccessful applicants.

### **Assessment of Full Proposals**

Participants involved in the projects developed during the workshop will be tasked with writing full proposals covering their intended activities as identified at the Ideas Lab. The deadline for submission of proposals generated at the Ideas Lab will be February 2013, and successful proposals will be jointly funded by BBSRC and NSF.

It is intended that full proposals that are led by a UK Investigator will be submitted to BBSRC via the Research Councils Joint Electronic Submission System (JeS). Proposals that are led by a US Investigator will be submitted to the NSF through FastLane or Grants.gov. Further guidance on this part of the process will be available at the Ideas Lab event. It is anticipated that proposals developed through the Ideas Lab would feature the following:

- Novel highly multidisciplinary research projects, clearly reflecting the distinctive opportunity for creating such projects that the Ideas Lab provides;
- Clear evidence that the team has the capability to deliver its project as a high quality multidisciplinary activity;
- Clear relevance to, and the potential to make a distinctive and novel contribution to, addressing the research challenge of reducing inputs of nitrogen fertilizers to non-leguminous crops whilst maintaining or increasing yield.

## Review Criteria for Full Proposals

The primary review criteria used throughout the process of developing and/or assessing proposals will be based on the NSF review criteria of Intellectual Merit and Broader Impact, and will focus on how well proposals address the vision of the call. A description of the NSF review criteria can be found in Chapter III of the NSF's Grant Proposal Guide, at [http://www.nsf.gov/pubs/policydocs/pappguide/nsf08\\_1/gpg\\_3.jsp#IIIA](http://www.nsf.gov/pubs/policydocs/pappguide/nsf08_1/gpg_3.jsp#IIIA).

Any collaborative project arising from the Ideas Lab and funded through this programme must have a signed Collaboration Agreement between the partners that clarifies the contributions and rights of each partner before the start of any grant. The sponsors of the Programme attach great importance to the dissemination of research findings and the publishing of information about the research they support in the public domain. However, all dissemination and publication must be carried out in the manner agreed in the project's Collaboration Agreement.

## Further Information

For further information please contact:

### **UK applicants:**

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### **FastLane Queries:**

Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 001-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system.