GFI Research Program
2019 Request for Proposals (RFP)

Phase 1 Applications Due: October 28, 2019
Phase 2 Applications (by invitation only) Due: December 16, 2019
Introduction

The Good Food Institute (GFI) is a global nonprofit building a sustainable, healthy, and just food system. Our scientists, entrepreneurs, lawyers, and policy experts are focused on using food innovation to answer the question: How can we feed the world’s growing population with safe and healthy foods produced through systems that benefit people, animals, and the planet? We focus on accelerating research, development, and the path to competitive commercialization for a promising solution to this question – namely, the production of meat through animal-free methods.

GFI and its Science & Technology Team specifically work to catalyze research and development to improve the organoleptic properties, price point, and production capacity of plant-based and cell-based meat products. To that end, GFI established a Research Program in 2018, made possible by the generous donations of philanthropic supporters. This program supports essential research designed to solve many of the challenges facing these industries and seeks to create open-access tools and methods for the development of appetizing, affordable, and widely available alternative protein products. Now in its second iteration, this competitive research grant RFP will serve as the next strategic step for advancing the science of four categories of alternative proteins to supply the global demand for meat. These categories include plant-based proteins, animal cell culture, non-animal cell culture, and recombinant proteins. For an overview of these categories, please refer to GFI food scientist MJ Kinney’s recent article, “Formulating With Animal-Free Ingredients,” published by the Institute of Food Technologists.

For additional information on GFI and the alternative protein industries we support, please visit: https://www.gfi.org/essentials

For additional information on the 2018 RFP and grant recipients, please visit: https://www.gfi.org/researchgrants

To provide feedback on this RFP or to clarify any of the information presented within, please contact GFI’s grant management team at: research_grants@gfi.org.
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Notable Changes From the 2018 RFP

The 2019 RFP and application process is different from the 2018 RFP in the following primary ways:

● A single RFP (this document) exists for all priority areas. In 2018, there were separate RFP documents for plant-based meat research and cell-based meat research.
● The application process is now a two-step procedure. We hope this change makes the application and selection process more efficient for both applicants and reviewers.
● Lead researchers cannot be undergraduate students. In 2018, undergraduate students were eligible to be the lead researcher. Undergraduate students may still participate in projects but are not eligible to serve as the lead researcher.
● In addition to plant proteins and animal cell culture, we are also explicitly including non-animal cell culture and recombinant proteins as acceptable research areas for 2019 as long as they are applied to meat products. For additional information on 2019 priority areas, please see the Funding Opportunity Priority Areas section below.
● Projects involving public-private partnerships may request up to $300,000 in funding from GFI, as long as the private partner(s) contribute at least 25% of the total project funds. Please see additional details in the “Award Information” section below.
● GFI’s grant management team will host virtual drop-in sessions in the weeks between the release of the RFP and the Phase 1 application due date. All prospective applicants are invited to attend any of these sessions to ask questions about the application process or receive feedback on project ideas. Please visit www.gfi.org/researchgrants to find out when sessions are scheduled.

Background

In the study, “Shifting Diets for a Sustainable Food Future,” the World Resources Institute estimates we will need 70% more food to meet global demand in 2050 than in 2006. It is unlikely that improvements in agricultural productivity alone will be able to close this gap, given that yields would have to increase 33% faster than they did during the Green Revolution. The authors suggest that closing this 70% food gap will require both productivity increases and dietary shifts away from consumption of animal-derived proteins, due to the fact that the production of animal-based foods involves substantially more resources and generates more environmental stress than the production of plant-based foods.

Decades of work by scientists, public health authorities, environmentalists, and others to persuade people to consume more plants and less meat have not reduced meat consumption. Despite rising awareness of the global impacts of our dietary choices, consumers continue to base their purchasing decisions primarily on price, taste, and convenience. Quite simply, reducing animal protein consumption is intractable for most people due to a lack of appetizing and affordable products that could serve as alternatives to conventional animal protein products. The challenge, then, is to innovate and bring to market diverse protein alternatives that are as delicious, price-competitive, and convenient as animal-derived food products are currently. By making healthy and sustainable alternative proteins comparable to conventional
proteins in the areas of flavor, price, and ubiquity, alternative proteins become the default choice.

Alternative protein sources currently fit into one of four categories from a production, cost, and infrastructure perspective: plant proteins, non-animal cell culture, recombinant proteins, and animal cell culture (Figure 1). Together, these ingredients and production methods can help supply the global demand for meat.

Figure 1

Categories of Novel Protein Sources

- **Plant proteins**
  - Proteins derived from plant ingredients. "Plant" defined by the domain Eukarya; kingdom Plantae. "Plant proteins" may refer to various ingredient forms, including dried seeds, whole and defatted flours, concentrates, isolates, and hydrolyzed isolates.
  - **Examples:** Whole and fractionated forms of legume and cereal flours.

- **Non-animal cell culture**
  - Ingredients encompassing anything but animal cells (including plant, fungi, algae, and bacteria sources) that (1) are produced using cultured methods, and (2) yield cells that are themselves the product (distinct from recombinant sources where just one component, such as protein, is desired).
  - **Examples:** Whole forms of algae and fungi in dry, fresh, or paste forms.

- **Recombinant proteins**
  - Proteins derived from fast-growing, highly efficient host microorganisms.
  - **Examples:** Individual proteins that serve as functional ingredients, such as soy leghemoglobin.

- **Animal cell culture**
  - Food matrix derived from animal cells that are cultured through a variety of methods and combinations (including recombinant protein production and the use of bioreactors).
  - **Examples:** Any animal muscle tissue composed of animal cells derived from red meat, poultry, seafood.

Funding Opportunity Priority Areas

This RFP seeks research proposals that will address the organoleptic properties of plant-based and cell-based meat products, their cost, and/or the scale-up of production processes. Projects may focus on a specific end-use application or the development of novel ingredients, methods, tools, and/or technologies.

While proposals across all four alternative protein categories will be accepted, we expect the majority of funded projects will focus on plant proteins, non-animal cell culture, or animal cell culture, with a specific focus on meat (including but not limited to beef, pork, poultry, and seafood). All funded projects will have primary applications to food products that replace animal-based foods and are intended for human consumption.

We are particularly interested in receiving proposals in three Priority Areas. Figure 2 summarizes the key goals of each Priority Area.
Figure 2

Key Goals of Priority Areas

**Priority Area 1: Sourcing and Scaling the Next Generation of Plant Proteins**

There is a need to explore novel sources of raw materials to create better plant-based foods. “Better” in this context means that the sensory experience (taste, texture, appearance, and aroma) is optimized for omnivores, not vegetarians. Innovations in ingredients – both novel and those already in use – and processing and manufacturing methods may be required for improved sensory experience. The global plant-based meat market is projected to be worth somewhere between $100B and $370B by 2035. Achieving these rates of growth will require vast scaling of the raw materials and supply chains that contribute to plant-based products. There is an urgent need to address bottlenecks to scaling and consider how the projected growth of the plant-based food industry — especially in regions with growing socioeconomic position and thus rapidly-growing animal protein demand — impacts the sourcing and scaling of proteins and other ingredients. Finally, we need to understand whether economies of scale and demand will do enough to improve prices or whether we must additionally address technological limitations with raw materials and the production processes. From a plant-based meat product perspective, we are especially enthusiastic about tailored solutions for chicken and seafood products.

**Priority Area 2: Differentiating Muscle and Fat Cells in an Animal Cell Culture Production Environment**

The first cell-based meat prototype debuted in 2013. While cell-based meat science has evolved in the past six years, more focus has been on optimizing and scaling up cell proliferation than cell differentiation. The industry would benefit from the creation of robust, scalable processes for muscle and fat cell differentiation in an animal cell culture production environment. Optimization of cell lines, creation of chemically-defined animal-free media, scaffolding systems, bioreactor design, and large-scale co-culture processes for cell-based meat
industry. For medium formulations and biopolymer-based scaffolding systems, attention should be paid to the suitability of the components for food applications and to how readily and affordably components can be sourced or processed for their intended application.

- **Priority Area 3: Optimizing Non-Animal Cell Culture Platforms and Recombinant Proteins as Ingredients for Animal-Based Food Replacements**
  Both plant-based and cell-based foods may benefit from the addition of animal proteins created through recombinant technology or from ingredients made from algae, fungi, and other single-cell microbial sources. Algae, fungi, or bacteria may provide the protein biomass for alternative meat products. Additionally, these ingredients may impart important sensory characteristics like taste or color, or provide important functional properties such as scaffolding support or nutritional value. For these ingredients to benefit the plant-based and cell-based meat industries, they must be characterized, optimized, and produced through low-cost, large-scale manufacturing processes.

The following types of projects will **NOT** be considered:
- Research involving animal subjects
- Human research and/or clinical trials
- Consumer acceptance and/or market research studies
- Research focused on the development of animal-based products blended with alternative proteins (for example, adding mushrooms to a beef burger)
- Research focused on pet foods
- Research on snack foods
- Research on insect protein
- Research that solely benefits one specific company or organization with no applicability to the overall alternative protein industry
- Research exclusively generating proprietary findings that cannot be openly shared

**Eligibility Information**

Applications submitted from any sector (academia, government, industry, nonprofits, etc.) and from around the world will be considered. Based on GFI’s foundational mission to support open-access research, the purpose of this program is to fund research that will be made available and accessible to benefit the alternative protein industry and global society as a whole. Therefore, all findings, protocols, and tangible materials generated through research supported by this program will be published under the Creative Commons Attribution 4.0 Generic License (CC BY 4.0, https://creativecommons.org/licenses/by/4.0/) or similar license. Whenever possible, materials and protocols will be deposited into existing databases or collections for ease of accessibility. Exceptions to this standard approach will be limited and accepted only in special cases where alternative terms are negotiated and agreed upon by GFI and the applicant in writing prior to release of any grant funds. While the creation of intellectual property is not prohibited, GFI reserves the right to withdraw acceptance of a
proposal if the potential grantee insists on intellectual property rights in the research that are not acceptable to GFI.

Graduate students or postdoctoral researchers may serve as the lead investigator on a project proposal. If invited to submit a Phase 2 application, a brief letter of support signed by a faculty member at the student or postdoc’s higher education institution must be submitted. The letter of support should state the faculty member’s commitment to serve as a project collaborator and advisor and to allow the proposed research to be carried out in his or her laboratory.

Lead researchers from projects that have previously been awarded a grant from GFI are eligible to apply to this RFP if their previously-funded project has already ended or will be ending by June 1, 2020. Proposals from labs that are currently receiving GFI grant funding are allowed if the lead researcher of the new submission is different from the lead researcher of the previously funded project.

Award Information

Proposals should include research goals that can be achieved in two years or less from the funding start date. The earliest anticipated start date for projects funded through this RFP is March 1, 2020. Ideally, projects will begin no later than April 30, 2020, although in special circumstances researchers may obtain approval to begin projects at a later date. The latest acceptable start date is May 31, 2020. Total budgets (including indirect costs) should be less than or equal to $250,000. Indirect costs can be no more than 10% of the requested direct costs for projects submitted by researchers at academic institutions, government labs, and nonprofit organizations. No indirect costs may be included in project budgets from researchers at for-profit companies.

In special cases, GFI may permit project durations longer than two years and/or budgets greater than $250,000. Applicants who want to propose a project requiring an extended timeframe and/or increased budget must contact GFI’s grant management team at research_grants@gfi.org before submitting their Phase 1 proposal to discuss the need for additional time and/or funding. GFI will then decide whether or not to allow an exception to the 2-year, $250,000 limits and will inform the applicant in writing of the decision.

The one pre-approved case for receiving up to $300,000 from GFI is for projects involving public-private partnerships. Public-private partnership projects are those that involve both researchers at a public institution (university or government) and from the private sector (startup, industry, contract research organization, etc.). GFI will provide up to 75% of the project funds to a maximum of $300,000 if the private sector partner(s) provide(s) at least 25% of the project funds. Public-private partnership proposals must follow all other requirements and eligibility considerations outlined in the RFP and award agreement. These research teams will identify one partner as the primary award recipient. GFI will grant its total financial contribution to that partner, who will confirm to GFI that the private sector funds are received and will be responsible for administering the appropriate award amounts to each project partner.
Application Process

The application process involves two steps. Phase 1 applications can be completed by any eligible applicant. Phase 2 applications are by invitation only.

To complete a Phase 1 application, applicants should fill out the information in this form. We encourage applicants to draft their responses in a separate document and then copy and paste the final answers into the form. Please note the strict character limits for each question. The following questions comprise the Phase 1 application form:

- **Lead researcher information:**
  - Name
  - Job Title
  - Affiliation
  - Email
  - Telephone
  - Work address

- **Project team information (for each key collaborator):**
  - Name
  - Job Title
  - Affiliation
  - Email
  - Country

- **Project information:**
  - Topic Area: plant-based meat research or cell-based meat research
  - Priority Area: plant proteins, animal cell culture, recombinant proteins and non-animal cell culture, or other
  - Project Title
  - Preferred Start Date (mm/dd/yyyy)
  - Project Duration (in months)
  - Total Requested Project Budget (in US dollars)
  - Project Summary (2000 characters or less)
  - What is the specific scientific or technical problem your project seeks to address and why is addressing that problem important? If your research helps further any of the sustainable development goals (SDGs), we encourage you to include this in your response. (1200 characters or less)
  - How does your project contribute to or expand the existing knowledge base? (800 characters)
  - List 1-3 primary objectives of your project. (800 characters or less)
  - What is the main expected outcome for each objective? (1200 characters or less)
  - What methods and experimental techniques will you use? (1200 characters or less)
  - How will your project improve the organoleptic qualities, cost, and/or scale-up of plant-based or cell-based meat? (800 characters or less)
○ Why are you and your project team well-positioned to carry out this project? (800 characters or less)
○ If you are successful in meeting your objectives by the conclusion of your project, what are the next steps? (800 characters or less)
○ How can the results of your project be translated into a commercial product or technology that can be utilized by academic researchers or companies? (800 characters or less)
○ What is your plan for sharing project outputs (protocols, data, results, and/or research tools and materials) with the larger scientific community? (800 characters or less)
○ Please list up to 5 papers published by you or others that provide relevant background support for your work.

Specific instructions for completing a Phase 2 application will be provided to successful Phase 1 applicants at the time they are invited to participate in Phase 2. In general, the Phase 2 application will require additional detail related to the research methods, the project timeline and deliverables, the roles and responsibilities of project team members, and the budget.

Submission and Award Notification Timeline

All eligible applicants are invited to submit a Phase 1 application on or before 5:00 pm EDT on Monday, October 28, 2019. No Phase 1 applications will be accepted after this time for any reason. Applicants will be notified of the outcome of their submission no later than three weeks from the date of submission. We encourage applicants to submit their Phase 1 applications before the deadline so that they will have more time to prepare their Phase 2 applications if invited to participate in Phase 2.

Invited Phase 2 applicants must submit their Phase 2 application on or before 5:00 pm EST on Monday, December 16, 2019. No Phase 2 applications will be accepted after this time for any reason. Phase 2 applicants will be notified of the outcome of their submission no later than January 20, 2020.

Review Process

All submitted Phase 1 proposals will undergo scientific review to determine their suitability for the scope and purpose of this RFP. A review committee comprised of GFI scientists will evaluate Phase 1 proposals and determine whether each project proposal will be invited to Phase 2.

Phase 2 proposals will be evaluated by at least three reviewers. A review committee comprised of GFI scientists and external reviewers (scientists not employed by GFI) will participate in the
evaluation of Phase 2 proposals and determination of awards based upon the evaluation criteria noted below.

GFI reserves the right to negotiate with project leaders regarding any of the content within their proposal including project aims and scope, budget, and timeline prior to making any final funding decisions. All decisions made related to funding, project duration extensions, and budget increases shall be made at the GFI review committee’s sole discretion and may not be appealed.

**Evaluation Criteria**

Phase 1 applications will be evaluated using the following criteria:
- Anticipated likelihood of removing scientific knowledge barriers and/or limitations in technologies facing the plant-based and cell-based meat industries
- Expected impact on one or more of the specific priority areas mentioned above
- Uniqueness of idea
- Plan for sharing project protocols, data, results, and/or research tools and materials with the larger scientific community

Phase 2 applications will be evaluated using all of the above Phase 1 criteria and these additional criteria:
- Suitability of project team to successfully carry out project goals
- Feasibility of project goals
- Realistic timeline and budget for proposed project goals
- Clarity, soundness, and logic of research plan
- Total funding available within the GFI research program

We recognize that our requirement for proposals to be written in English means that many researchers may be writing in a non-native language. This will be taken into consideration when we are evaluating the proposals, and we will not penalize researchers who may be writing in a second or third language. We funded research proposals from eight different countries through our 2018 RFP (Canada, China, Estonia, Israel, Norway, Serbia, UK, and U.S.). We will continue our focus on funding the best research from around the world.

**Award Administration**

Prior to disbursement of any funding, the lead researcher, faculty advisor (if lead researcher is a graduate student or postdoc), and university official (if required) must sign an award agreement with GFI to ensure that both parties are in agreement regarding the use of the grant award. The award agreement will detail the award specifics as well as the requirements for award recipients (see below).
For projects that will be completed in 12 months or less, the entire project budget will be disbursed within three weeks from receipt of the signed award agreement. For projects that will be completed in more than 12 months, the budget required for the first 12 months will be disbursed within three weeks from receipt of the signed award agreement. The remaining budget will be disbursed once the awardee has successfully completed any midterm reporting requirements (see below).

Proposals that are accepted by GFI and that result in the granting of funds will have the following information made public: the project title; project summary; project team members’ names, titles, and affiliations; and other information deemed relevant by GFI, such as a description of the proposed project scope, purpose, and grant amount. Information within a proposal that applicants wish to remain confidential must be clearly marked as confidential, privileged, or proprietary within the proposal. GFI will hold this information in confidence to the extent permitted by U.S. law, but reserves the right to require removal of such confidentiality requirements as part of accepting the proposal and awarding funds if the proposal is otherwise accepted. For proposals that do not receive funding, GFI will release no details about the researchers involved or the content within the proposals. We may release anonymized aggregated statistics regarding the number of proposals received, the types of institutions they came from (i.e., public vs. private), and the countries of the researchers’ institutions, but no identifying information will be included in these statistics. Applicants have the right to withdraw applications at any time by sending a request indicating their desire to do so to research_grants@gfi.org.

Requirements for Award Recipients

Expectations of and specific requirements for award recipients will be explained in the award letter that must be signed by authorized officials from both GFI and the grantee’s organization prior to receipt of any funding.

The basic requirements include but are not limited to:

- Publishing project results in a peer-reviewed scientific journal.
- Consent to be featured on GFI’s website, blog, and social media with a short description of your project goal(s).
- Attendance at the 2020 GFI conference and participation in a poster presentation. Phase 2 proposals may include travel expenses for this conference in the project budgets.
- Timely response to a phone call or email from a GFI scientist about every 3 months to provide brief information regarding project progress, results, and any technical challenges that have arisen.
- A brief written update (no more than 2 pages) on project progress at least every six months for projects that are 12 months or longer. For projects that are less than 12 months, a brief written update will be required at least halfway through the project’s duration.
- A written summary (no more than 4 pages) outlining the project outcomes, potential next steps, and final expense report for how funds were utilized must be submitted...
within 30 days of the conclusion of the project. This summary should also include instructions for accessing data or obtaining research materials generated from the project. For example, if the project resulted in a newly-sequenced crop genome, where was that genetic data deposited and how can it be accessed online? If a new protocol was developed, where can it be accessed (or have the researchers shared it directly with GFI)? If a new technology or research tool was created, how can other researchers find and utilize it?

Thank you for your interest in the GFI Research Program. Please email any questions related to the Program or this RFP to research_grants@gfi.org. You can check the website at www.gfi.org/researchgrants to see when virtual drop-in sessions with GFI’s grant management team are scheduled.