

## **2019 Request for Applications (RFA): Visible Molecular Cell Consortium AND Center for Trans-scale Structural Biology and Biophysics Predoctoral Fellowships**

### **Executive Summary**

- UC San Diego is pleased to announce a Predoctoral Fellowship Program associated with the Visible Molecular Cell Consortium and the Center for Trans-scale Structural Biology and Biophysics. This program is open to all promising applicants at UC San Diego with the purpose of bridging disciplines and methodologies and to foster new cross-laboratory activities which will catalyze development of computational methods and/or datasets suitable for modeling and simulation of whole cells or subcellular domains, including key macromolecular constituents.
- This funding opportunity solicits Individual Fellowship applications from promising applicants with the potential to become productive, independent investigators in research on the multi-scale structurally-enabled functional biology of the cell. Each applicant must have one primary sponsor/mentor and one co- sponsor/mentor representing different disciplines from either UC San Diego or a neighboring institution.
- We anticipate supporting approximately three to five awardees annually.
- The total project period for the work described, and the period of fellowship support is to be one year. Based on progress determined at the end of the third quarter of the first year, a second year of support may be considered, for highly productive fellows whose work is deemed likely to result in a highly significant outcome. Awardees will be required to submit a two-four page progress report prior to the end of the annual award cycle.
- The participating institution(s) will be expected to bear the costs of laboratory supplies used in the training and research of the awarded fellows.

### **Section I. Funding Opportunity Description**

#### **1. Background**

Biological science is on the cusp of a new and transformational way to view living systems – the creation of physical molecular models of the fundamental unit of life, the cell. Such an undertaking will lead to an understanding of the continuity of life’s mechanisms from the atom to the organism. Its potential will be in how we can more comprehensively control cellular behavior in sickness and in health, and in transforming cell biology from an observational to a synthetic science.

Several technical and scientific advances have brought us to this inflection point. Structural data from atomic resolution x-ray crystallography and NMR spectroscopy, to electron and light microscopy is now available at a wide range of length scales – ranging from atomic resolution structures of cellular protein and nucleic acid components to organelle and larger cellular structures. Biophysical approaches including fluorescence microscopy and mass spectrometry can now define spatial distributions and dynamics, and expression and concentration levels are obtainable via technologies ranging from chip arrays and other mRNA technologies to proteomic analyses. Complementary to these experimental methods are the bioinformatic and systems biology approaches that describe and analyze molecular interaction networks, signaling pathways and information flow in complex cellular environments. Underpinning all of these advances is the continuing exponential growth of computer power, in parallel with the ability to gather and integrate enormous amounts of experimental data, and to then use that data to drive physical simulations. Computation will play a key role in turning these islands of data into a continuous landscape of interdisciplinary and cross-scale collaborations and knowledge.

## ***2. Purpose and Objectives***

While constructing and simulating computational models of an entire human cell are beyond our current capabilities, we are initiating this training program in interdisciplinary research to foster new research and methodologies that will contribute to progress toward this long-term goal. The systems that we envision being studied within these fellowships may include large biological systems such as enveloped viruses, bacteria, large biomolecular assemblies or machines, cellular organelles or non-enveloped cellular complexes, cytoskeleton and other cellular structural elements. Connection to biomedical challenges is strongly encouraged.

We also intend to support the exploration and development of computational framework(s) that allow and enable integration of all kinds and types of relevant biological data streams (e.g., genomic sequences, x-ray crystallography data, microscopy data, HDX-MS data, etc.) into one interoperable context. This may also include development or application of new or emerging mathematical techniques to biological systems of interest, or the development of computational programs / frameworks that provide new scale crossing capabilities.

Collaboration: A specific objective of the program is that fellows should be prepared for research careers in which collaboration and integration across levels of analysis are key elements. Plans for fostering collaborative relationships during the training period should be addressed. The purpose of the dual mentorship nature of this fellowship is to bridge between two different and complementary aspects of cellular structure across scales of space or time and across disciplines. Examples of the kinds of cross disciplinary collaborations that this program wishes to foster are, but not limited to:

- Bridging between computational and experimental biology of cellular components
- Bridging across spatial or temporal scales of structural cellular systems

- Integration of bioinformatic, proteomic or metabolomics data with structural biological data

Fellows will be expected to gain broad research exposure in an area of molecular cell biology and/or neurobiology as well as in an allied discipline not typically associated with these disciplines such as, mathematics, physics, bioengineering, informatics, systems biology, computer science or translational medicine (but not exclusive to these areas). Active mentorship by a primary sponsor/mentor and a co-sponsor/mentor, representing different disciplines or levels of analysis, is required. Fellowship awardees are required to pursue their research training on a full-time basis normally defined as at least 40 hours per week.

## **Section II. Award Information**

### ***1. Mechanism of Support***

This mechanism is intended for predoctoral candidates who are in a PhD program at UC San Diego, and for postdoctoral candidates who have received a Ph.D., D. Sci., or equivalent doctoral degree from an accredited domestic or foreign institution prior to activation of the award.

### ***2. Funds Available***

Awards pursuant to this funding opportunity are contingent upon the receipt of a sufficient number of meritorious applications, the program priorities of UC San Diego and the continuing availability of funds.

The opportunity will also support fellows who require 0% salary coverage, but who seek to use capability resources or core facilities within the VMCC umbrella as part of their interdisciplinary project. This could be relevant for trainees who, for example, are already supported by NIH T32 training grants, NIH F31/F32 Fellowships, or NSF Graduate Research Fellowships.

### ***3. Stipends***

This fellowship award provides 100% of tuition, stipend, and fees to predoctoral trainees.

## **Section III. Eligibility Information**

### ***1. Eligible Applicants***

Any individual with the skills, knowledge, and resources necessary to carry out the proposed research training is invited to work with his/her sponsors at UC San Diego to develop an application for support. Individuals from underrepresented racial and ethnic groups as well as individuals with disabilities are always encouraged to apply.

## **2. Other Eligibility Criteria**

Duration of Support: The duration of support under this RFA should minimally be for one year and maximally for two years.

Sponsors/Mentors: Before submitting a fellowship application, the applicant must identify a sponsoring institution and an individual who will serve as a primary sponsor (also referred to as mentor or supervisor) and will supervise the training and research experience, as well as a co-sponsor from a different allied discipline. The sponsors/mentors should be active investigators in the areas of the proposed research who are committed to the research training of the individual and will directly supervise the candidate's research. The sponsors/mentors should each document the availability of sufficient research support and facilities for high-quality research training, as well as how this dual sponsorship/mentorship will facilitate the interdisciplinary research and training program for the applicant. In most cases, the Fellowship supports research training experiences in new settings in order to maximize the acquisition of new skills and knowledge. Opportunities for the fellow to obtain additional guidance from other subject matter experts during the research training experience are encouraged.

## **Section IV. Application and Submission Information**

### **1. Submission Dates and Times**

Application Receipt Date: July 15, 2019

Review Dates: July 15-30, 2019

Earliest Anticipated Start Date: August 1, 2019

Latest Anticipated Start Date: September 1, 2019

### **2. Funding Restrictions**

Tax Liability: Internal Revenue Code Section 117 applies to the tax treatment of all scholarships and fellowships. The Tax Reform Act of 1986, Public Law 99-514, impacts on the tax liability of all individuals supported under this fellowship program. Under that section, non-degree candidates are required to report as gross income all stipends and any monies paid on their behalf for course tuition and fees required for attendance. Degree candidates may exclude from gross income (for tax purposes) any amount used for tuition and related expenses such as fees, books, supplies, and equipment required for courses of instruction at a qualified educational organization.

### **3. Sponsor/Mentor Information**

The applicant's two sponsors/mentors, who will directly supervise the applicant's research, should be active investigators in the area of the proposed research and meet the eligibility requirements.

## **Section V. Application Review Information**

Applications submitted for this funding opportunity will be reviewed by the Steering Committees of the UC San Diego Visible Molecular Cell Consortium and the Center for Trans-scale Structural Biology and Biophysics, which will evaluate applications for scientific and technical merit.

As part of the merit review, applications:

- May undergo a selection process in which only those applications deemed to have the highest scientific merit will be discussed and assigned a priority score
- All applications will receive a written critique

The following will be considered in making funding decisions:

- Potential for interdisciplinary training
- Potential to promote, align with, and develop transformative advances in the interdisciplinary studies of interest to the CTSBB and/or VMCC
- Overall scientific merit of the proposed project as determined by the review panel
- Qualifications of the fellow him/herself
- Qualifications of the mentors/PIs
- Relevance to mission priorities and portfolio balance of the Fellowship program
- Availability of funds
- For VMCC fellowships, inter-institutional dual mentorship may be given preference

## **Section VI. Review Criteria**

### **1. *Candidate***

- An assessment of the candidate's previous and current academic and research performance
- An assessment of the candidate's potential to, and commitment to, becoming an important contributor to biomedical, behavioral or clinical science

### **2. *Sponsors/Mentors and Training Environments***

- An assessment of the quality of the training environments including the institutional commitments to research training, the quality and availability of the facilities and related resources (e.g. equipment, laboratory space, computer time, subject populations), and the availability of research support
- The qualifications of the sponsors as mentors for the proposed research training experience, as well as researchers including successful competition for research support
- Statements from each sponsor/mentor indicating how they will work together to foster the interdisciplinary training and research of the applicant

### **3. *Research Training Proposal***

- The merit of the scientific proposal

- The quality of the research training plan

## **Section VII. Application Format**

Application should be prepared using NIH format, 11 pt Arial font, 0.5 inch margins, and should contain the following sections:

**1. Preamble** (300 words max): clearly articulated layperson description of the Interdisciplinary Challenge-to-be-Addressed and the requirement for involvement of cross-disciplinary faculty

**2. Research Plan Required Sections** (4 pages max):

- Significance and brief background, including a clearly articulated description of the Interdisciplinary Challenge-to-be-Addressed
- Innovation of the proposed approach
- Progress Report Summary (ONLY FOR RENEWAL APPLICATIONS)
- Approach
- Description of the interdisciplinary collaboration including the complementarity and representation of different disciplines of the primary sponsor/mentor and a co-sponsor/mentor, is required. In addition, plans for fostering collaborative relationships during the training period should be addressed

**3. Personal Statement** (1 page max), written by the fellow, describing career and research goals.

**4. NIH Biosketch of the Proposed Fellow** (2 page max)

**5. Training Plan Provided by Mentor(s)** (1 page max):

- Plans for training within and across disciplines
- Plans for soft skills training, including giving talks, proposal writing, etc.
- Plans for ethics training

**6. NIH Biosketch of the Primary Mentor** (4-page max, Other Support section must be included).

**7. NIH Biosketch of the Secondary/Co-Mentor** (4-page max, Other Support section must be included).

All sections 1-7 listed above should be compiled into a single PDF application package, and emailed to: [visiblemolecularcell@gmail.com](mailto:visiblemolecularcell@gmail.com) by the **application deadline of 11:59PM July 15, 2019**.