Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Very Good

Explanation to Applicant

The applicant is an undergraduate in an accelerated PhD program and has an excellent academic record and is recipient of several scholastic awards. The applicant published a co-authored publication and another publication, as a co-first author, is in the preparation. It seems the applicant is very well exposed to the basics of structural biology rigors that include training, publishing, and presenting on public platforms. The proposal is very well written and the preliminary data supports the feasibility. The applicant proposed to solve a high-resolution structure of filamentous viral protein by single-particle analysis. It would be better if the applicant attempts to solve the structure by using helical reconstruction methods - exploiting symmetry to achieve high-resolution. It is also evident that cryo-EM resources for high-resolution structure solution are a limitation. However, the applicant proposed to use cryo-EM resources at other institutes as part of a collaboration. I am not sure how this will help the applicant's training and growth until unless the applicant obtains direct access to the necessary resources.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Excellent

Explanation to Applicant

The applicant was involved in several outreach efforts. For example, the applicant developed and administered training to student volunteers on social and academic advising for undergraduates, with a particular emphasis on first-generation students. The applicant held yearly orientations to first-year students on how to approach prospective laboratories, further taught as TA and acted as student mentor during a summer research program.

Summary Comments

In summary, the applicant is an excellent candidate for the fellowship. The applicant's reference letters are excellent and demonstrate the strong potential and capabilities of the applicant as a promising young scientist.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

The applicant is an exceptional student and researcher. The applicant is a Goldwater Scholar in addition to numerous research awards and scholarships. The applicant's academic record is superb all while the completing a dual BS-MS degree. Two publications are listed, with at least one more in preparation. The applicant has had the opportunity to share their research to the broader scientific community through several conference and symposia posters and oral presentations. Through the BS-MS degree program, the applicant has two main research projects. One involves structurally characterizing the spike protein of the Orsay virus that infects C. elegans and the other Master's project focuses on a virus with a filamentous capsid and how this shape capsid can accommodate double-stranded RNA. The proposal aims to characterize the unique filamentous capsid structure of the CcFV-1 virus in order to clarify how this virus is capable of viral transcription and translation given its confined capsid structure. The proposal incorporates the use of purified virus-like particles for cryo-EM analysis as well as assessing protein-protein interactions to understand the transcription process taking plane in this specific capsid. The broader impacts of the proposed

research would allow insight into how other viruses with filamentous capsids can replicate. Letters are exceptionally strong and rate the applicant among the very top students all have worked with. Letter writers describe a highly motivated, creative and talented budding scientist.

Broader Impacts Criterion

Overall Assessment of Broader Impacts
Excellent

Explanation to Applicant
The applicant has faced the challenges of being a first-generation college student from a low-income background and excelled. This resilient applicant has used these experiences to help other student struggling when they start college by being a peer-mentor, tutors, succeed in science courses and helping develop programs to help students find research labs. The applicant has made it a priority to give back to their university community in many ways. The applicant is a Student Ambassador who mentors students from low-income backgrounds or are first-generation college students to help them feel welcome at the university as well as encourage them to get involved in research. The applicant has helped to train other peer mentors in how they can support and encourage the first-generation students they are mentoring. The applicant has served as a TA for several courses as well as trained as a Teaching Fellow. The applicant wants to create a more inclusive environment for students wanting to purse STEM fields who may have faced financial or other challenges in their lives. The applicant aspires to be a structural biologist who makes teaching and outreach a priority.

Summary Comments
The proposal aims to characterize the unique filamentous capsid structure of the CcFV-1 virus in order to clarify how this virus is capable of viral transcription and translation given its confined capsid structure. The applicant has the motivation, skill-set, creativity, determination and motivation to excel as a graduate student and become a leader in their chosen area of expertise. The applicant has the potential to make a great impact on the lives of other students entering STEM from unique backgrounds. The reference letters fully support the applicant's potential as a future exceptional scientist. Intellectual merit and broader impacts are both excellent.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit
Very Good

Explanation to Applicant
The applicant proposal focuses on using cryo-EM to investigate the colletotrichum camelliae filamentous virus (CcFV-1) packages its double-stranded RNA. While this project is interesting and will shed significant insights into how these proteins polymerize and package the RNA genes, obtaining fix size protein aggregated particle may be challenge to characterize with cryo-EM or other forms of structural determination. However, given this intricacies of this work the proposal is well laid out and relatively well justified. The letters of support indicate that the applicant is mature, ambitious and has the training to be successful in graduate school.

Broader Impacts Criterion

Overall Assessment of Broader Impacts
Very Good

Explanation to Applicant

The applicant has benn a TA in several courses including biochemistry, organic chemistry and virology. He was also an ambassador for first-generation low-income students. He is coauthor in a published article in J. Virology and one as co-first author in preparation.

Summary Comments

The applicant has obtained BS/MS degrees in biochemistry at Rice University in four years. In addition, the applicant is a straight A student. The applicant grew up poor and had to take care of a younger sibling while a student at Rice. His journal and accomplishments seem impressive. At the time of this application, the applicant his not decided where he intends to pursue a PhD degree.