

## Score for Portman, Zachary

### Intellectual Merit Criterion

#### Overall Assessment of Intellectual Merit

Very Good

#### Explanation to Applicant

The applicant has demonstrated the skills and ability to work independently allowing for more diverse work to be accomplished in a short period. He has also sought out opportunities to gain these skills and has used them to advance this area of study. I would have liked to have seen some oral presentations or posters to show the ability to analyze and present scientific data.

### Broader Impacts Criterion

#### Overall Assessment of Broader Impacts

Very Good

#### Explanation to Applicant

The proposed work has a broader impact to society due to the current decline in bees and the necessity of bees for pollination. Results of this work can have an impact on many important crops. The applicant has also worked collaboratively with different disciplines and understands that value to science.

## Score for Portman, Zachary

### Intellectual Merit Criterion

#### Overall Assessment of Intellectual Merit

Very Good

#### Explanation to Applicant

The applicant has identified an original and key area of research and plans to conduct a revision of an important genus of native bees. The applicant's skills in computer science and previous training in biological identification would be used in a synergistic fashion to combine digital and morphological data together (via DNA barcoding and morphological specimen identification). The applicant plans to use the BOLD software to generate trees and in the case of a mismatch to value morphology over DNA data. Given the prevalence of computational methods (such as maximum likelihood, Bayesian methods) to assess the evolution of a group, one might expect more explicit phylogenetic or cladistic analyses as well once the applicant begins graduate study. The applicant has provided evidence of intrinsic motivation and a talent for combining biological and computational methods.

### Broader Impacts Criterion

#### Overall Assessment of Broader Impacts

Fair

#### Explanation to Applicant

The applicant has a plan to share the results of the research via a website that would make access easier for non-expert entomologists to use. The impact of the research would identify bees for conservation and populations to be monitored during ongoing climate change.

## Score for Portman, Zachary

### Intellectual Merit Criterion

#### Overall Assessment of Intellectual Merit

Excellent

#### Explanation to Applicant

I was thoroughly impressed by this application package. It is well written and the proposed research is well thought out and important. The applicant clearly has the maturity and ability to meet the Intellectual merit criteria outlined by the National Science Foundation.

### Broader Impacts Criterion

#### Overall Assessment of Broader Impacts

Very Good

#### Explanation to Applicant

The student does a good job of making a case that the work proposed here will indeed meet the expectations outlined in the National Science Foundation broader impacts criteria. I have no doubt the results and resulting tools will benefit society and be widely distributed in a way that is meaningful.