

# Protein Visualization Practical Exercises Using Pymol in Multiple Year Levels of an Undergraduate Biochemistry Program

**Shane Austin**

University of West Indies, Cave Hill Campus, Department of Biological and Chemical Sciences,  
P.O. Box 64, Bridgetown, St. Michael BB, Barbados  
([shane.austin@cavehill.uwi.edu](mailto:shane.austin@cavehill.uwi.edu))

Using Pymol to aid student visualization of proteins and protein stabilization features is a powerful tool in teaching protein biochemistry. Pymol often helps students move from abstract concepts such as hydrogen bonds and salt bridges, to visualizing how these bonds and other non-covalent features contribute to protein 3D structure and function. The practical exercises presented in this poster focus on building student's competence using Pymol. In a second-year exercise, students are shown basic secondary features such as loops, sheets and helices. They explore how hydrogen bonds and other interactions contribute to these features and start to visualize unique features such as pi helices. While in a final year course exercise, students use Pymol as a tool to visualize the complex interactions between the various subunits of the oxidative phosphorylation machinery. Responses from students in the second-year course have been favorable over 2 years of running the practical. Most students are pleased with the exercises and find they reinforce the lecture content. While the advanced course practical has been run for one semester and has been received very favorably by biochemistry major students.

**Keywords:** protein visualization, Pymol

## Mission, Review Process & Disclaimer

The Association for Biology Laboratory Education (ABLE) was founded in 1979 to promote information exchange among university and college educators actively concerned with teaching biology in a laboratory setting. The focus of ABLE is to improve the undergraduate biology laboratory experience by promoting the development and dissemination of interesting, innovative, and reliable laboratory exercises. For more information about ABLE, please visit <http://www.ableweb.org/>.

Papers published in *Tested Studies for Laboratory Teaching: Peer-Reviewed Proceedings of the Conference of the Association for Biology Laboratory Education* are evaluated and selected by a committee prior to presentation at the conference, peer-reviewed by participants at the conference, and edited by members of the ABLE Editorial Board.

## Citing This Article

Austin S. 2019. Protein visualization practical exercises using Pymol in multiple year levels of an undergraduate biochemistry program. Article 56 In: McMahon K, editor. *Tested studies for laboratory teaching*. Volume 40. Proceedings of the 40th Conference of the Association for Biology Laboratory Education (ABLE). <http://www.ableweb.org/volumes/vol-40/?art=56>

Compilation © 2019 by the Association for Biology Laboratory Education, ISBN 1-890444-17-0. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

ABLE strongly encourages individuals to use the exercises in this proceedings volume in their teaching program. If this exercise is used solely at one's own institution with no intent for profit, it is excluded from the preceding copyright restriction, unless otherwise noted on the copyright notice of the individual chapter in this volume. Proper credit to this publication must be included in your laboratory outline for each use; a sample citation is given above.