Amino Acid Sequence Analysis of Cytochrome C in Bacteria and Eukarya Using Bioinformatics

Instructor Guide

Introduction:

Course: This activity is designed for General Biology (cell and molecular bio) for Majors.
Time: ~3 hours, although it can be shortened to 2 hours.
Materials: activity documents, computers with internet connection
Student preparation: knowledge of translation and proteins, computer literacy
Summary: This activity compares amino acid sequences of cytochrome C for different species using bioinformatics.
Purpose:

1. Understand and use bioinformatics with the programs BLAST and Seaview.
2. Compare and contrast amino acid sequences of cytochrome C in humans, other animals and bacteria.
3. Relate amino acid sequences of cytochrome C from various species to genome evolution and protein function.

Resources:

PPT (for instructor): Introduction, results and conclusion of the activity
Student Activity: handout for student
Student Activity with answers (for instructor)
Appendix: handout for student needed to complete activity
Videos (embedded in PPT):

- C-DEBI introduction: https://www.youtube.com/watch?v=wiYzGL4iTY8&feature=youtu.be
- Exercise 1 demonstration: http://youtu.be/yv7Tbo3XyOw
- Exercise 2 demonstration: http://youtu.be/xY_FOkSfhu0
- Exercise 3 demonstration: http://youtu.be/-XfF8sJaZ-c

Activity Outline

1. Instructor introduces the activity (~20 min)
    a. Use PPT as a guideline to introduce metabolism and bioinformatics
    b. Video introduction of C-DEBI:
2. Students complete activity (~60 – 120 min)
    a. Divide students into groups of 2 per computer
    b. Have students follow the appropriate youtube video as they complete each of the 3 exercises. It is best if they watch a part of the video, pause it, complete that task, then continue to the next part of the video.
        i. Exercise 1 demonstration: http://youtu.be/yv7Tbo3XyOw
        ii. Exercise 2 demonstration: http://youtu.be/xY_FOkSfhu0
        iii. Exercise 3 demonstration: http://youtu.be/-XfF8sJaZ-c
    c. Students complete the 3 exercises in the activity
    Note: To reduce time, you may group 2 pairs of students together for a larger group of 4. Both pairs of students complete exercise 1. Then one pair completes exercise 2. The other pair completes exercise 3. All 4 students then

explain their exercise to each other. All 4 students complete conclusion together.

3. Instructor reviews activity with the students (~20 min)
    a. Use PPT to review results and discussion

TOOLKIT CREDITS:

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WEBSITE:

http://www.coexploration.org/C-DEBI/toolkits_biology.html