



Cell Differentials: A White Blood Cell Identification Exercise

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Cell Differentials

In traditional labs, the recognition of white blood cell types can be compromised by several factors. Developmental changes can make recognition difficult for novices. Also, some cell types exhibit similar features. This kind of learning experience can profit from feedback, but microscopy can be a very individualistic kind of experience in which opportunities for feedback can be limited to spot checks of student comprehension. Student feedback can also be compromised by differences in learning styles. Some individuals are much more assertive about obtaining instructor feedback. *Cell Differentials* was developed as a wet lab preface, to provide abundant real-time feedback, incentives for competency-based learning standards, and tools to monitor individual learning needs more effectively.

Instructions

Turn on the microscope by clicking on the switch in the top-right of the screen. Once a new cell appears in the microscope field, identify the cell type by clicking on the correct "clicker" key at the lower left. The number of each cell type scored is recorded in a small field above each key and displayed graphically in the "raw scores" histogram on the right side of the clicker.

The exercise can be repeated as many times as you wish, in 100-cell sessions. Note that the exercise calculates a mean quiz grade from the three most recent 100-cell sessions. Earlier quizzes are ignored in the calculation to encourage students to strive for three successive high scores as a demonstration of their proficiency. To start another 100-cell session, click the switch off and on again. The quiz scores are advanced to the next quiz field to make room for a new quiz. Note that the "Mean" quiz field is blank once a quiz has begun and is not yet finished. On the 100th score, the mean quiz score is displayed. At this point, the window might be printed and passed in for a grade.

Cell Differentials provides several kinds of feedback:

- a. When an incorrect cell identification is made, the correct answer is highlighted on the clicker. You may then click anywhere to continue the exercise.
- b. Quiz scores are calculated to encourage students to repeat the experience until they have become proficient. Only the last three quiz scores are used to calculate the mean quiz grade, so as to encourage students to persevere in their development of a high level of proficiency.
- c. The light board on the top-left of the screen provides a graphical summary of the student's last experience. This is intended to allow the student and instructor to identify and review individual learning needs. Clicking on a red or green light

brings up a dialog box that provides more details about the student's recognition of those particular cell types.

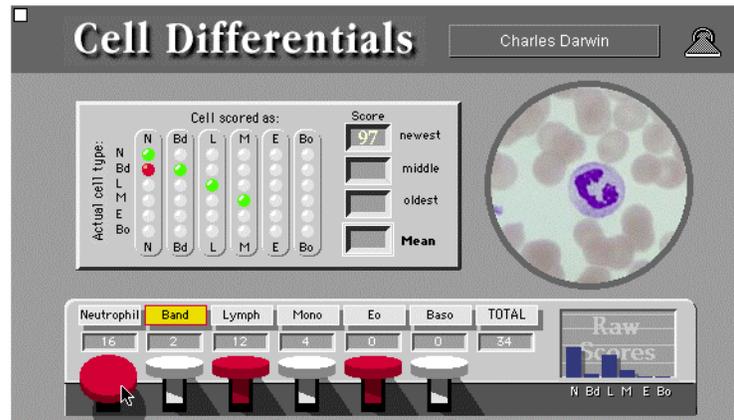


Figure 1. Three kinds of assessment tools to provide real-time feedback, encouragement to master the material, and diagnostic clues about individual learning needs.