Making Secondary Science Accessible with APH Products

Tuesday, January 24, 2023

Rosanne Hoffmann, Science & Health Product Manager, APH
Laura Hospitál, Science Teacher, Texas School for the Blind & Visually Impaired
Learning Objectives:

After participating in the webinar, the participants will:

• Identify and describe 5 APH products to be used in secondary education classrooms
• Identify pre-teaching strategies for 5 APH products
• Observe how the Submersible Audio Light Sensor can be used as a proxy when designing science experiments
Agenda

• Build-A-Cell
• DNA Twist
• DNA-RNA Kit
• Protein Synthesis Kit
• SALS (Submersible Audio Light Sensor)
Introduction

• All products available with Quota funds
• Limitations of models and tactile graphics
  o Size
  o Views
  o Not necessarily comprehensive
Introduction, 2 of 2

• TVIs need not master science content to make it accessible!
• TVIs need to provide APH material to the classroom teacher
  • Remind them they are universally designed
• Students can meet with the teacher if they are struggling
Build-A-Cell: Description

• Two binders
  • Embossed braille Student & Teacher Guide (UEB)
  • Structure Kit
• Key to internal & external structures (2)
• Storage panels (3)
• Three templates
• Three sets of organelles
Build-A-Cell: Description, 2 of 2

• Universal design
• Saves TVIs and classroom teachers’ time
• Appropriate for teaching & assessment
  • Introduce as much or as little complexity as needed
• Comparison among three different cell types
  • Animal
  • Plant
  • Bacterial
Build-A-Cell: Pre-teaching tips

- Introducing the model to students
  - Cognitive and educational levels
- How to use a key
- Assessing tactile acuity & braille skills
  - Explore in a pre-teaching session
- What is a cell? What is an organelle?
- Comparing prokaryotic and eukaryotic cells
Build-A-Cell: Demonstration
Build-A-Cell: Discussion & Application

• MS and HS students
• NGSS standards: MS level
  • All living things are made up of cells
  • Within cells, special structures are responsible for particular functions
• How do students interact with the model?
• Organelle sets
  • Replacement parts available
  • Print letters now included
DNA Twist: Description

- Accessible to all students
- DNA “ladder” and stand
- 3-D model
- LP Guidebook
DNA Twist: Pre-teaching tips

• Show flat model first
• Ask for feedback (self-discovery)
  • Four colors and textures
  • Color & texture patterns
DNA Twist: Demonstration
DNA Twist: Discussion & Application

• MS & HS students
• NGSS standards
  • All cells contain genetic information in the form of DNA.
  • DNA molecules contain four different kinds of building blocks, called nucleotides, linked together in a sequential chain.
• DNA twist represents part of a gene (segment of a chromosome)
• Limitations of the model
  • Cannot “unzip”
DNA-RNA Kit: Description

- Product development
- Guidebook in large print
  - Downloadable as BRF and PDF
- 32 DNA subunits
- 32 RNA subunits
- Interactive model for all students
DNA-RNA Kit: Pre-teaching tips, 1 of 2

• How do puzzle pieces fit together?
  • Blanks and tabs
• Students may need practice
DNA-RNA Kit: Pre-teaching tips, 2 of 2

• What is the purpose of DNA?
• What is DNA made of?
• What is a nucleotide?
• How do we relate this information to the DNA Twist?
What is the purpose of DNA?

- DNA transcribed $\rightarrow$ RNA translated $\rightarrow$ Protein
What is a nucleotide?

Phosphate

Sugar

Nitrogenous Base

Nucleotide
DNA Nucleotides
Single and double DNA strands
Relate double strand to DNA Twist
DNA to messenger RNA (mRNA)
Protein Synthesis Kit: Description, 1 of 2

- Shows mRNA translation to protein (amino acid sequence)
- Includes
  - Transfer RNA subunits
  - Amino acids
  - Genetic Code (LP & braille)
  - Translation tactile graphic
  - Guidebook
Protein Synthesis Kit: Prerequisite knowledge

- Review: DNA → RNA → Protein (amino acid chain)
  - Protein is a folded amino acid chain
    - Tangle Toy
How to translate messenger RNA (mRNA)

- Triplets: sets of three nucleotides
Review of the Protein Synthesis Kit

• DNA transcribed → RNA translated → Protein
Submersible Audio Light Sensor (SALS): Description, 1 of 2

• Development
• Detects light & converts to sound
  • Probe
  • iOS and Android apps
• Notifies student of a change in an observed phenomenon
• Liquids and air (surfaces)
• High light: high tone
• Low light: low tone
• K-12 with supervision
• Proxy for an observed phenomenon
SALS: Pre-teaching tips

• Downloading an app
• Caring for smart device during science activity
• Safety using probe (glass wand covered in black plastic)
SALS: Discussion

• Can detect light in liquids as well as air (surfaces)
• Examples
  • Liquid pH indicator color change in test tubes or beakers
  • Detection of a dark precipitate resulting from a chemical reaction
  • Detection of grayscale differences in rock surfaces
  • Location of stars comprising a constellation (printout)
Thank you!

rhoffmann@aph.org
hospitall@tsbvi.edu