

TITLE OF LESSON

Biology Unit 1 Lesson 24 – Languages of a Cell and the History of the Discovery of DNA as the Genetic Material

*How do cells store and transfer information?*

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TIME ESTIMATE FOR THIS LESSON

One class period

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ALIGNMENT WITH STANDARDS

California – Biol CB 1d; G4 & G5a

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MATERIALS

slides or overheads of:

nucleotides and amino acids

Griffith Experiment

Hershey and Chase Experiment

**Teacher's Notes Lesson 24** – Teacher Page

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LESSON OBJECTIVES

- To compare three languages (English, Spanish and Japanese) with the three languages of a cell (DNA, RNA and protein)
  - To learn the basic constituents of DNA, RNA and proteins
  - To learn about the history of the discovery of DNA as the genetic material and understand what scientists believed at that time
  - To learn that what is “Dogma” today was not so in the past and that what we believe can change over time
  - To learn listening comprehension and note taking
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FOCUS AND MOTIVATE STUDENTS-WARM UP ACTIVITY

- 1) Homework Check – Hand back all graded assignments. Collect all homework.
  - 2) **Agenda** – Have students copy the agenda you posted.
  - 3) Instructions – Before you begin, explain to the students that they will be learning about listening comprehension and note taking today. Their responsibility will be to listen to the lecture and take notes. Then they will be responsible for writing up an outline summarizing what they learned. This can be done individually or in pairs. Have your chosen student take notes on the overhead as before. Make sure you write the student's name in your grade book.
  - 4) Universal Languages – Ask a different student to come to the board and write what he/she thinks is the universal language of the world. Ask the others if they agree. Chances are high that the student will write “English.” What language do they consider the second most common? Today, Spanish is spoken in more countries than any other language. Ask why a common language is important or useful. Explain that a common language allows for communication between people. Similarly, a common language allows for communication in cells, as well.
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ACTIVITIES – INDIVIDUAL AND GROUP

1. Display Images – Find images of DNA, RNA and amino acids to show the students during the lecture. There are images available in Starr's textbook *Biology concepts and applications* as well as images of DNA in <http://gened.emc.maricopa.edu/Bio/BIO181/BIOBK/BioBookDNAMOLGEN.html> and amino acids and proteins in <http://gened.emc.maricopa.edu/Bio/BIO181/BIOBK/BioBookCHEM2.html>.
2. Cell Information Flow – Write *universal language* on the board and put *English* under it. Then write *second most common language* and put *Spanish* under it. Write another language with different symbols and put Japanese or Chinese under it. Ask the students if they know how information flows or is communicated in cells.



3. Lecture – Begin your lecture with the following information:  
Outline the flow of information in a cell. DNA to RNA to protein. These are essentially the three languages of a cell –DNA (English), RNA (Spanish), and proteins (Japanese). Explaining the similarities of verbal languages we know with the languages the cell uses helps the students visualize the similarities. For example, DNA is the universal language of all cells. In the world English is basically the universal language, i.e. more people in the world speak or write English to communicate than any other. The Internet is basically in English. The second most important language in a cell is RNA because it transfers information from the nucleus to the cytoplasm. In the world, Spanish is the second most common language. There are similarities between these languages. English and Spanish use the same characters or letters to create these languages. There are some differences such as the ñ in Spanish that is not used in English. You can write some English and Spanish words under the categories if you like, such as water (in English) and agua (in Spanish), Spanish (in English) and Español (in Spanish). Note that the only character difference is the ñ. For instance, DNA and RNA are made up of nucleotides, Adenine (A), Guanine (G), Cytosine (C), Thymine (T) and Uracil (U). Both use A, G and T, the only difference is that DNA uses T and RNA uses U. On the other hand, Japanese uses a variety of symbols to create its language instead of letters. This language is very different than English or Spanish. Well, Protein is the third language of a cell. Combining amino acids to form a long chain creates proteins. This language uses completely different characters (20 different amino acids – you can show a table of amino acids) than DNA or RNA (nucleotides). For this reason it is more like Japanese than English or Spanish. In all cases, communication occurs but translation and knowledge of the languages are necessary.
  4. Note Checking – Stop your lecture. At this point, walk around and briefly check the students’ notes. Do they have the main ideas and is it in a form that is easy for someone else to follow? Ask them what they think makes for good notes. Then continue with activity 5. The students continue with their notes.
  5. Lecture 2 – Present the lecture/discussion material found in **Teacher’s Notes Lesson 24**.
  6. **Applaud/ Critique** – When you have finished your lecture, have students **Applaud/Critique** the notetaker. While they are doing this, initial their notes for the day. You cannot collect them because they will need them to write up their outline. They will turn both their notes and the outline in tomorrow.
  7. Peer Revision – Ask students to take out the first draft of their Lab Report #2. Tell them they will be revising it with a partner today. They should follow the steps in their **Lab Report #2 Requirements** sheet. Remind them that draft 2 is due tomorrow when they walk in the door. Tell them they will have the rest of the period to revise. If they do not finish by the end of the period, it is their responsibility to finish on their own time.
  8. Homework Review – If they finish early, have the students start working on their outlines. Give them advice and help on how to write up a good outline of the data discussed today. Then review their homework before the bell rings.
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#### HOMEWORK

- 1) Read Starr’s textbook *Biology concepts and applications* chapter 12, pp. 190-193. Include material such as DNA structure and function, the discovery of DNA including Griffith’s experiments, as well as Hershey and Chase’s experiments. Write up the key points for your reading.
  - 2) Write up an outline of the most important points from the lecture including new vocabulary.
  - 3) Finish draft 2 of Lab Report #2. Due tomorrow when you walk in the door.
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#### GROUP ROLES

None

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#### DOCUMENTATION FOR PORTFOLIO

Lab Report #1  
Method – Photoshop Image

