

TITLE OF LESSON

Biology Unit 1 Lesson 35 – Recombinant DNA Technology Continued  
Vectors, cDNA library, Hybridization and Isolation: How does man control what's on the inside and outside of a cell?

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TIME ESTIMATE FOR THIS LESSON

One class period

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ALIGNMENT WITH STANDARDS

California – Biol CB 1; G5c-d

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MATERIALS

Poster paper  
markers and pens  
colored paper  
scissors  
glue or tape  
other materials for making a poster  
**DNA handout** – Reading

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LESSON OBJECTIVES

- To learn how scientists move one piece of DNA from one place to another and how they make copies of it
  - To learn about vectors
  - To learn how one to makes a cDNA library and how one to searches for specific sequences in this library
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FOCUS AND MOTIVATE STUDENTS – WARM-UP ACTIVITY

- 1) Homework Check – Collect all homework. Hand back all graded assignments. Have students place them in the appropriate section of their binders. Remind them that their binders are due today.
- 2) **Agenda** – Have students copy the agenda you posted.
- 3) Review – Briefly review the function of a restriction enzyme and then ask the students what they think can be done next. Yippee! Big deal! You cut the DNA, but what can you do with that cut DNA? Take as many answers from students as possible before you include your answer, as students may come up with the answer you have.

**Some possible answers: You can insert the cut piece of DNA into a vector, you can combine the DNA with another piece of DNA to form recombinant DNA, you can clone the fragment, you can make a genomic or cDNA library or you can sequence it.**

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ACTIVITIES – INDIVIDUAL AND GROUP

1. **Vocabulary** – Write the target vocabulary words listed below on the front board. Ask students to copy the words on a separate sheet of paper. Next, ask them where they might find the definition for each of these words. If students say the dictionary, have them try looking them up in a dictionary. If they cannot find them, why not? Point out that many of the terms listed are specific terms used in science. Now, ask them where they might find scientific terminology. Hopefully, they will suggest the glossary of their textbook or the index. Tell them they will have 10 minutes to look up and define these words. They may work in their groups to find them, but they must write them out individually. You will collect them for credit at the end of 10 minutes.

vectors	complementary DNA
plasmids	reverse transcriptase
DNA clones	library
cDNA	hybridization

2. **Silent Reading** – Pass out the student reading titled, **DNA Handout**. Give a copy to each student. Have each

student highlight and annotate the material. They should write down at least 2 questions that they have. Remind students that the vocabulary they looked up should help them with their understanding of the reading. Give them 10 minutes to complete this task. At the end of 10 minutes call time.

3. Questions – Ask students to share their questions with their group. All group members should write down the questions of everyone in their group on a separate sheet of paper. Then they must attempt to come up with answers to their questions for five minutes. At the end of five minutes call time.
4. Present – Have the whole class meet to find answers to the questions they still have not received answers for. They should also check to make sure that the answers they came up with are correct. Have each group present their questions with their answers. The class should agree or disagree with the answers individual students give in order to come to agreement on the answer, making sure that students are writing answers down. Facilitate the discussion to help students to help each other to get all of their questions answered correctly.
5. Display Images – It would be a good idea to have images of the techniques (formation of recombinant DNA, DNA fingerprint, insertion of DNA into a vector, cloning of the fragment, formation of a genomic or cDNA library, detection of the DNA by probing, and synthesize cDNA) attached so that they can visualize the techniques, as well. There are some images in Starr's *Biology Concepts and Applications*, fig 15.4, p. 225 and fig 15.7, p. 227 as well as figs 10-14, 10-15, 10-17, 10-18, 10-19, and 10-20 in *Essential Cell Biology* by Alberts et al. 1998. Many scientific catalogues have diagrams of vectors and this could be one source of images for this part of the lesson.
6. Individual Poster – Have the students make a poster in which they do the following
  - a) Show how one starts with a sample of DNA and ends up with many copies of one piece of DNA (or clone) that they are interested in studying.
  - b) Show how to find that DNA within a cDNA library.
  - c) Write a fictitious sequence of DNA that you are searching for.
  - d) Show how one goes from DNA in an organism to the formation of a library on your poster.
  - e) Draw a schematic of how to isolate the sequence of interest.
  - f) Use colored paper or pens to color code the information.
  - g) Label all the procedures (DNA isolation, hybridization, cDNA library formation) and the steps within them (see lecture notes for steps).

Give them the rest of the period to work on this. Tell them it is due tomorrow at the beginning of class. So whatever they do not finish in class today is homework. Tell them they may help each other out, but each person must make their own poster with their original ideas about the visual/diagram for each step of the process.

7. Homework Review – Collect the student's questions and answers for credit.
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#### HOMEWORK

- 1) Complete your poster. Due tomorrow when you walk in the door.
  - 2) Study vocabulary and concepts to date.
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#### GROUP ROLES

Recorder – The recorder will take a copy of the notes and put it in the class folder

Manager – The manager will hand out the copies of the reading material and images. During the poster session the manager will hand out the materials needed to make the poster.

Illustrator – The illustrator will draw images for the poster

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#### DOCUMENTATION FOR PORTFOLIO

Lab Report #1

Method – Photoshop Image

Lab Report #2

Evaluation Essay #1

Method 2 – Photoshop Image