

Controlling Gene Expression

Apply

Skills: Communicating, comparing, interpreting

Making Sense of Introns and Exons

Scientists were very surprised to find that RNA in eukaryotes undergoes extensive alteration between transcription and translation. Sections called introns are literally cut out of the transcribed RNA. The remaining sections, called exons, are then spliced together to form the final version of messenger RNA. In this activity, you will model the editing and splicing of RNA.

MATERIALS

paper RNA strip (about 2 cm x 30 cm)
 scissors
 adhesive tape
 metric ruler

PROCEDURE

1. Draw lines every centimeter across your RNA strip so that the strip is divided into 30 boxes.
2. The following list of numbers represents a gene encoded on a DNA molecule. Transcribe (copy) this information onto your RNA strip by writing a number in each box.
 06-08-03-03-15-23-03-03-26-25-15-22-27-22-13-03-03-27-04-03-03-01-02-03-03-12-03-03-14-22
3. Use the key below to translate your RNA strip into a "polypeptide" phrase. Write the phrase in the space provided.

Key to Genetic Code

Code	Letter
01	Z
02	Y
03	X
04	W
05	V
06	U
07	T

Code	Letter
08	S
09	R
10	Q
11	P
12	O
13	N
14	M

Code	Letter
15	L
16	K
17	J
18	I
19	H
20	G
21	F

Code	Letter
22	E
23	D
24	C
25	B
26	A
27	space

Polypeptide phrase:

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Making Sense of Introns and Exons (continued)

4. Notice the code sequences 03-03 on your RNA strip. These sequences mark the beginning and end of an intron. Use your scissors to cut your RNA strip just before the first 03-03 sequence and just after the second 03-03 sequence. Discard the section of RNA beginning and ending with 03-03. Use adhesive tape to reconnect the two cut ends of the RNA strip. Repeat this procedure until you have removed all of the sections beginning and ending with the 03-03 sequence.
5. Use the key to translate the edited RNA strip into a polypeptide phrase. Write the phrase in the space provided.

ANALYZE AND CONCLUDE

- 1. Compare the two polypeptide phrases you translated. Which one makes more sense? Explain your answer.

2. Suppose the introns were not removed from a piece of RNA coding for an important enzyme. How would the enzyme produced be different from the normal enzyme? Explain your answer.

3. What is the purpose of the 03-03 sequence in the code you transcribed? Do you think the actual DNA code has a sequence with a similar function? Explain your answer.

4. Scientists estimate that less than 5 percent of the total DNA base sequence in humans codes for genes. The other 95 percent is sometimes referred to as "junk" DNA because scientists do not know what this DNA does. Explain why the DNA sequences coding for introns might be considered "junk" DNA.

