

1) What model of mRNA localization would fit for the localization of mRNA for a protein that is secreted?

The best fit is trapping. The mRNA and ribosome are not transported via the cytoskeleton nor is it degraded in certain areas. The analogy is not exact, but the general ideas are similar.

2) What are two bits of information that can be coded for in the 3' UTR of an mRNA?

Binding of miRNA and transport of mRNA

3) How could a miRNA lead to decreased mRNA levels?

Some miRNAs can interact with the matching gene sequence, inducing methylation of the DNA that blocks transcription.

4) What mechanism might explain the presence of plentiful mRNA but little protein being present?

Binding of miRNA that blocks translation.

5) How could looking at the sequence of a gene tell you where the protein was located? How could where in the gene you found this information tell you about where the protein might be located?

Amino acid sequences can code for information about where a protein needs to be transported to. Signal peptides are always at the beginning of the protein, while nuclear localization signals can be anywhere,

6) What is the connection between fetuses who are exposed to poor nutrition and smoking?

Both may lead to the adaptation to thriftiness as adults due to poor fetal nutrition.

7) What is different about the genes of a totipotent cell versus a pluripotent cell?

A pluripotent cell has already irreversibly packaged some of its DNA, none of the totipotent cell's DNA has been irreversibly packaged yet.

8) What evidence suggests that DNA packaging is different between animal and plant cells?

Some mature plant cells are totipotent while few mature animal cells are.

9) What is the function of many of the hox proteins?

They are transcription factors.

10) If you were studying the SRY gene, coded on the Y chromosome. Could you tell when SRY begins to be expressed using a reporter gene? Would a reporter gene allow you to determine the stability of SRY protein?

Reporter genes can tell when or where transcription of a gene is activated, but since the reporter gene protein is different from the SRY gene, no information about the SRY protein can be determined.

11) Which genes are likely to be expressed first, pair-rule genes or hox genes?

Pair-rule genes are expressed first to set embryo organization, then hox genes help determine which of those parts will become what adult cells.