Chapter 16 Homework

Ch. 16: 8, 11, 13, 21, 25, 36

8. Consider the following wild-type and mutant sequences:

Wild-type ….CTTGCAAGCGAATC….

Mutant ….CTTGCTAGCGAATC….

The substitution shown seems to have created a stop codon. What further information do you need to be confident that it has done so?

11. By base-pair substitution, what are all the synonymous changes that can be made starting with the codon CGG?

13. a. Acridine orange is an effective mutagen for producing null alleles by mutation. Why does it produce null alleles?
    b. A certain acridine-like compound generates only single insertions. A mutation induced with this compound is treated with the same compound, and some revertants are produced. How is this outcome possible?

21. Differentiate between the elements of the following pairs:
    a. Transitions and transversions
    b. Synonymous and neutral mutations
    c. Missense and nonsense mutations
    d. Frameshift and nonsense mutations

25. A certain compound that is an analog of the base cytosine can become incorporated into DNA. It normally hydrogen bonds just as cytosine does, but it quite often isomerizes to a form that hydrogen bonds as thymine does. Do you expect this compound to be mutagenic, and, if so, what types of changes might it induce at the DNA level?

36. You are working with a newly discovered mutagen, and you wish to determine the base change that it introduces into DNA. Thus far, you have determined that the mutagen chemically alters a single base in such a way that its base-pairing properties are altered permanently. To determine the specificity of the alteration, you examine the amino acid changes that take place after mutagenesis. A sample of what you find is shown here:

Original: Gln–His–Ile–Glu–Lys
Mutant: Gln–His–Met–Glu–Lys
Original: Ala–Val–Asn–Arg
Mutant: Ala–Val–Ser–Arg
Original: Arg–Ser–Leu
Mutant:Arg–Ser–Leu–Trp–Lys–Thr–Phe

What is the base-change specificity of the mutagen?