

HW 12: Chapter 24: 4, 6, 14, 15

(4) 192 amino acids
1440 bases

The protein should contain 480 amino acids, but the gene has introns that are not expressed. In this case, the protein should be encoded by:

192 amino acids \times 3 nucleotides / amino acid = 576 nucleotides

So 864 (1440 - 576) nucleotides are introns.

(6) The topoisomerase must add the same number of (+) and (-) supercoils so that $\Delta LK = 0$

(14) a) The faster moving band on the bottom is supercoiled DNA. The slower moving band on the top of the gel is relaxed DNA

b) TOPI relaxes the supercoiled DNA, so the lower, supercoiled DNA band disappears

c) DNA ligase won't change the supercoiled nature of DNA, so no effect will be observed

d) Gyrase will promote supercoiling so the upper band will disappear.

(B) a) There is a distribution of overwound and underwound states

b) Positively supercoiled

c) Some of the DNA strands have broken during isolation, and/or some of the samples are (+) supercoiled and some are (-) supercoiled

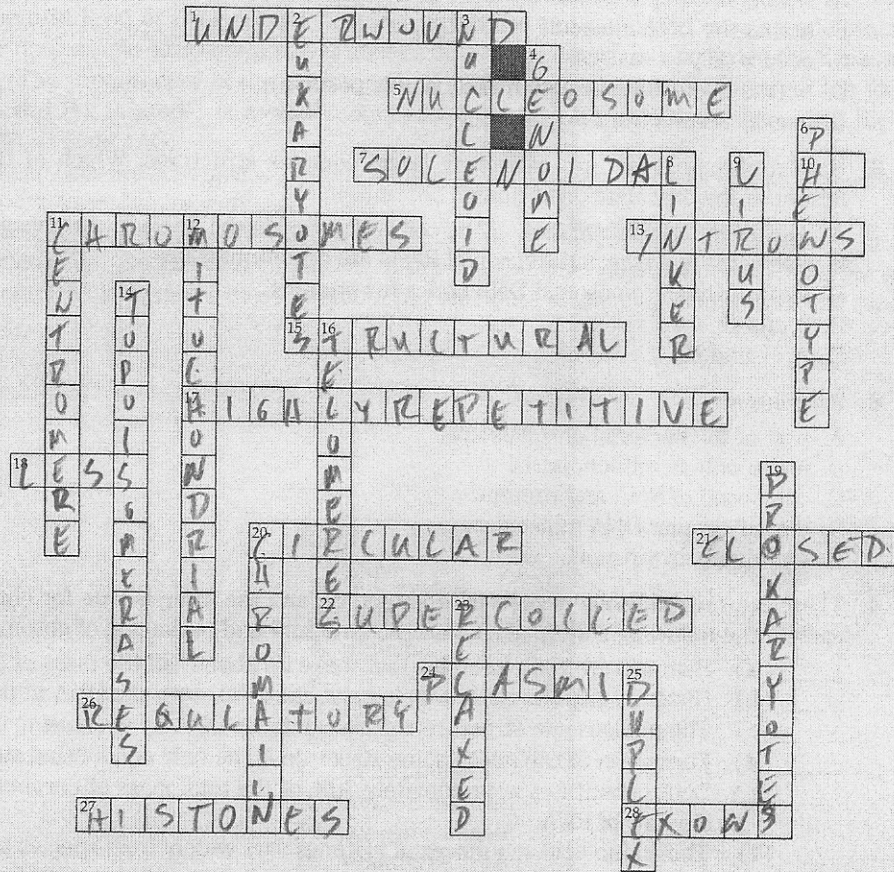
d) By eyeballing the position of the band λ/μ the -0.057 and -0.066 , we can say that the σ value is ~ -0.05 .

SELF-TEST

Do You Know the Terms?

ACROSS

1. State of DNA double helices that is thought to promote transcription by facilitating strand separation.
5. DNA plus two each of histone 2A, 2B, 3, and 4.
7. Supercoiled DNA structure assumed in most cells (due to the association of proteins), known as _____ supercoiling.
10. Higher-order structure of DNA, referred to as a 30 nm fiber, requires the association of the protein _____.
11. Structural units made up of DNA and associated proteins; contain heritable genetic information.
13. Nontranslated regions of DNA in the genes of most eukaryotes.
15. DNA supercoiling is the result of _____ strain on the molecule.
17. Describes sequences of DNA usually associated with centromeres and telomeres. (2 words)
18. The linking number for underwound DNA is _____ than that for relaxed DNA.



20. Describes plasmid and bacterial DNA, which lack telomeres.
21. Again, describes DNA molecules in plasmids and bacteria.
22. *In vivo* state of most double-stranded DNA.
24. Circular, extrachromosomal DNA that can replicate independently of genomic DNA.
26. Regions of DNA that influence *where* gene transcription starts and ends and the *rate* of transcription; called _____ sequences.
27. Proteins that contain a relative abundance of the amino acids H, R, and K.
28. Coding regions of DNA that usually specify amino acid sequences for only a portion of the final protein.

DOWN

2. Organisms that package most of their genetic material in a membrane-bounded nucleus.
3. Region of a bacterial cell that contains its genetic information.
4. All of the information needed to make an entire organism.
6. Property of an organism that is the product of the information contained in the genome.

8. Treating chromatin with DNase degrades _____ DNA.
9. Its genetic information is encoded in either DNA or RNA.
11. Structure essential for the separation of chromosomes during cell division.
12. Extrachromosomal DNA in eukaryotes includes _____ DNA.
14. Enzymes that alter the linking number for a given molecule of DNA; especially important in the process of DNA replication.
16. Formed by repetitive DNA sequences; help to stabilize linear DNA.
19. Organisms that lack cellular organelles; for example, bacteria.
20. The stuff (in nondividing cells) of which chromosomes are made.
23. DNA that is not supercoiled and not underwound is said to be in a _____ state.
25. Most DNA exists as a _____ of polynucleotide strands.