EXAMINATION VI

UNDERLINE ALL THE ALTERNATIVES WHICH ARE CORRECT.

1. In replica plating

   a. separate colonies, one should make the first copy on the same medium as the master plate.
   b. continuous colonies, the first copy can usually be used in place of the master plate.
   c. continuous colonies, it is necessary to label the positions the plates have taken on the velvet.
   d. separate clones, spontaneous mutations within a clone can be disregarded.
   e. one can transfer phage as well as bacteria.

2. DNA

   a. is sometimes one-stranded, like RNA must be.
   b. synthesized in vitro has many of the properties of the primer DNA but is not biologically active.
   c. is probably self-replicating in many places in the universe at the present time.
   d. is itself a linear polymer.
   e. can normally occur uncombined with other substances.

3. Escherichia coli strain K-12

   a. usually reproduces sexually, each organism being one of three mating types.
   b. produces one clone from a single individual.
   c. is attacked by more than one type of virus.
   d. is best isolated by the use of the replica-plating technique.
   e. was discovered by Lederberg and Tatum in 1946.

4. The fertilization process in bacteria always

   a. produces recombination.
   b. involves two whole cells.
   c. involves two different mating types, of which one must be F^-.
   d. involves two of the nuclei in an E. coli cell.
   e. includes transfer of DNA, but excludes transfer of RNA.

5. Salmonella typhimurium

   a. undergoes sexual recombination as does its relative E. coli.
   b. undergoes transduction via phage P22.
   c. is attacked by T4, which can carry more than one bacterial marker at a time.
   d. has n'its, each of which is capable of being carried by a transducing phage.
   e. has some of its genes arranged in the same order as the chemical processes occur which these genes control.

6. By becoming infected, a bacterium

   a. can change its mating type.
   b. can shift its manufacture of DNA and protein from one type to another.
   c. runs the risk of lysis because all the virulent virus usually enters the cell.
   d. may become a prototroph even if it was previously auxotrophic.
   e. may give rise to progeny which have lost a specific allele present before infection.

7. Smaller plant and animal viruses

   a. are always composed of RNA which is usually single-stranded.
   b. may require several hours after infection to produce daughter particles.
   c. which specify only a few proteins may not be so virulent for this reason.
   d. do not have the protein tail so characteristic of bacteriophage.
   e. are often difficult to assay because of their size.

8. Mixed infections involving different strains of a virus

a. do not occur with tobacco mosaic virus although they do occur with influenza virus.
b. can give rise to phenotypic mixing and heterozygosis, but not to true genetic recombination.
c. occur with vaccinia virus, leading to recombination of its genes.
d. do not occur for viruses containing RNA.
e. do not occur if the technique of limit-dilution is employed.

9. The number of n'its in a genome

a. is greater for free-living than for parasitic or symbiotic organisms.
b. can give an estimate of the number of genes therein, simply by dividing by 2×10^3.
c. is a good estimate of the total number of crossover sites.
d. is approximately equal to the number of mutational sites.
e. refers to the number of linearly arranged organic bases in a set of genes, whether in RNA or DNA.

10. If a clone is streaked across agar including a section containing sufficient streptomycin,

a. no appreciable growth will occur on the plate if the clone was prototrophic and the medium minimal.
b. its growth, everywhere but on the streptomycin, shows it is streptomycin-resistant.
c. you can be sure no sexual processes are taking place to confuse the results.
d. mutation to streptomycin-resistance would be indicated if a very small amount of growth occurred in the streptomycin-containing region, but much growth occurred in the drug-free region.
e. uniform growth along the streak indicates the clone is streptomycin-resistant, although it may be auxotrophic.

11. Genetic recombination in bacteria

a. cannot be visualized as an asexual process except through the use of the electron microscope.
b. proved that gene exchange must have occurred by a sexual process.
c. can only occur between auxotrophs for different nutritional requirements.
d. may be the cause of new virulence.
e. can be induced by man in a way that ordinarily does not occur in nature.

12. The fluctuation test of Luria and Delbrück

a. showed that the medium used did not select mutants preferentially.
b. gave a normal distribution for the number of mutants in different samples tested.
c. was the first demonstration with bacteria of the occurrence of mutations without regard to the specific medium upon which the mutants are detected.
d. showed that mutations can occur any time in clonal growth.
e. gave results easily reproduced by using techniques of replica plating.

13. Purified nucleic acids can act genetically

a. when introduced into tobacco, mammalian, or bacterial cells.
b. when they are either RNA or DNA.
c. when these have been obtained from organisms other than viruses.
d. and when taken from virus can produce complete daughter virus particles.
e. even after they are surrounded by a protein coat unlike their original one.

14. F^- cells of E. coli

a. cannot contribute any of their hereditary material to other cells.
b. can become Hfr cells only by first becoming F^+.
c. are sites for synapsis and crossingover.
d. can be heterogenotes or heterozygotes.
e. cannot be lysed by lambda unless exposed to ultraviolet light.

15. Bacteriophage

a. does not contain phosphorous in its protein.

b. may be infective even when its coat is punctured or removed.
c. contains no RNA in its coat, tail, or spiral fiber.
d. is not infective when multiplying.
e. could not be detected if it multiplied slower than its host.

16. The r region of T4

a. contains 1% of the total n'its present in that phage.
b. is composed of about 100 cistrons, as detected from spontaneous mutation experiments.
c. is especially suitable for studies of genetic recombination rates.
d. cannot lyse strain K-12 when it is mutant.
e. can only demonstrate recombination when hosts are mixedly-infected.

17. Whenever the research of the workers listed in column A can be associated with an item in column B place the appropriate number in the space provided.

A.	B.	
1. Sinton		
2. Benzer		
3. Hershey and Chase	Plant virus	_____
4. Schramm	Origin of life	_____
5. Lederberg and Tatum	Protein	_____
6. Demerec	Salmonella	_____
7. Fraenkel-Conrat	Phage	_____
8. Luria and Delbrück	RNA	_____
9. Wollman and Jacob	F^+ mating type	_____
10. Zinder	DNA	_____
11. Levinthal		
12. Miller and Urey		
13. Burnet		