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.
- 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 replicaplating 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.

- Mixed infections involving different strains of a virus
 - a. do not occur with tobacco mosaic virus although they do occur with influenza virus.
 - 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.
 - 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 pro-

- cess 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 Delbrtick

- 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 \underline{r} region of T4

в.

- a. contains 1% of the total n'its present in that phage.
- 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.

- Sinton
 Benzer
- 3. Hershey and Chase
- 4. Schramm
- 5. Lederberg and Tatum
- 6. Demerec
- 7. Fraenkel-Conrat
- 8. Luria and Delbrück
- 9. Wollman and Jacob
- 10. Zinder
- 11. Levinthal
- 12. Miller and Urey
- 13. Burnet

Plant virus
Origin of life
Protein
Salmonella
Phage
RNA
F⁺ mating type
DNA