Outline - Lecture 1

1. Organization of nucleus in bacteria: No true nucleus; no nuclear membrane; no nucleolus; DNA has no protein with it. Slides 1, 2, 3, 4.
DNA in a ring. E. coli - 1 to 1½ mm. in length
Replication: no mitotic apparatus. Slides 5, 6.
Position of start: E subtilis: two classes found:
E. coli: position with F factor present Slide 7
No mitotic apparatus: cell membrane: slide 8

2. Types of genes found in bacteria: Classes

Class A: Structural genes - make protein from mRNA. Enzymes; Mutantsites; changes in amino acid at site change. Transcription

Class B: Only RNA produced - no transcriptions to protein

Ribosomal genes - ribosomal RNA Transcription process
Transfer RNA - transcription process
Regulator genes - possibly no transcriptions; related to other molecules.

Class C: Special classes: Super suppressors- Type-1 Bact. phage. RNA phage DNA
Transcription process? Transfer RNA?

Type-2 Sm^r: Related to ribosomes

Operators: special part of a gene structure

3. Organizations of genes in bacterial chromosome:

Operons - two types: regulator with and away from gene:
Histidine operon: Slide 9

Genes not together: Arginine: Slide 10.

Gene order and base ratios of DNA in bacteria: Salmonella E. coli
Other bacteria.

4. Transformation and transduction: significance for higher organisms.

1). Transformation: Synapsis and exchange on molecular level

2). Transduction: bacterial Genes brought into bacteria by phages:

5. Bacterial viruses - DNA phages. Different types; different sizes.

Examples: phage particle: Slides 11, 12
Attachment to bacteria: Slide 13
Injection of DNA: Slide 14.
Phage chromosome - small phage, Lambda: Slides 15, 16. ;
Appearance of bacteria during phage reproduction: Slide17.
Order of genes in phage: T-4; Slide 18.

Transduction process: Type types: Incorporation: Diagrams.
Abortive transductions: Slide 19

Importance of Transductions: Molecular synapsis;
Gene action of piece of DNA when not in bact. chromosome.

6. Comparisons of above with higher organisms: 1) Chromosomes of higher organisms: Slides 20-23.

2) Activity of gene: must remove histone,

3). Types of genes: same as in bacteria plus regulator genes of higher orders.

4). Organization of genes: not as in bacteria - operons.for synthetic pathways.

5). Synapsis: somatic cells: Diptera; few others.

6). Somatic crossing over - fungi, diploid cells: Aspergillus; Yeast.

Higher organisms: Drosophila; Occas. in maize.

7). Activity of fragments of chromosomes in higher organisms: Mustbe within a nucleus: ShBz fragment - two chromomeres: functional genes Fragment in cytoplasm - not functional if not in small nucleus.

Behavior and gene action when chromosoes not together but in nuclei:

Divergent Spindle - recessive gene at meiosis in male only. Slides 24 to 29.

If no nucleus formed: fragment in cytoplasm - pycnotic: Slide 30

7. Lysogeny in bacteria: meaning for higher organism.

(a) Two potential events when phage enters bacteria

(b) Incorporation of phage into bacterial chromosome: Slide 31. No Veg. reproduction; Reproduces as part of bacterial reduplicat system. Lysogenic bacteria formed.

How to tell lysogenic bacteria from non-lysogenic:
Sensitive vrs. resistant: meaning.
Forced veg. reproduction of phage:

(c) Position of incorporation of phage: One position reason any different positions: meaning.

8. The sex-factor F episome. DNA. Does not lyse bacterium; division with bacteria but not incorporated: Slide 32.

Conjugation and F factor - males and females. Slide 33

F incorporated into bacteria: Conjugation; transfer of bact. chromo. recombination; Relation to X chromosome controlling element in Sciara. Positions of incorporation: Effects produced on recombinations.

9. Single stranded phage: Need for duoble strands in: Reproduction Transcription: One strand read only.

10. Summary.