

# MICROBIOLOGY

## BACTERIAL GENETICS

### I. MOLECULAR GENETICS

#### A. THE "CENTRAL DOGMA" AND GENE EXPRESSION

1. DNA
  - a. STRUCTURE OF THE GENOME
  - b. **REPLICATION**
2. RNA
  - a. STRUCTURE
  - b. **TRANSCRIPTION**
  - c. TYPES OF RNA
3. PROTEIN
  - a. STRUCTURE - THE PEPTIDE BOND
  - b. **TRANSLATION** - RIBOSOMES & tRNAs
4. THE GENETIC CODE
  - a. SENSE, NONSENSE & START CODONS
  - b. UNIVERSALITY

#### B. REGULATION OF GENE EXPRESSION

1. REPRESSION (OR INDUCTION)
  - a. THE LAC OPERON
    - 1) THE REPRESSOR
    - 2) THE OPERATOR(S)
    - 3) THE PROMOTER
    - 4) STRUCTURAL GENES
  - b. OTHER OPERONS
2. CATABOLITE REPRESSION (THE GLUCOSE EFFECT)
  - a. cAMP AND CAP
  - b. THE CAP BINDING SITE

### II. MUTATIONS

#### A. POINT MUTATIONS

1. MISSENSE
2. NONSENSE
3. FRAMESHIFTS

#### B. LARGE MUTATIONS (DELETIONS, INSERTIONS & DUPLICATIONS)

#### C. MUTAGENS & THE AMES TEST

### III. GENETIC TRANSFER IN BACTERIA

#### B. **TRANSFORMATION**

1. HISTORICAL PERSPECTIVE & NATURAL TRANSFORMATION
2. THE COMPETENT CELL
3. METHODS

#### C. **CONJUGATION**

1.  $F^-$ ,  $F^+$ ,  $F'$  AND  $Hfr$  STAINS -- THE F FACTOR
2. THE CONJUGATION BRIDGE
3. LARGE GENETIC MAPS - INTERRUPTED MATINGS

#### D. **TRANSDUCTION**

1. TRANSDUCING PHAGE (CERTAIN BACTERIAL VIRUSES)
2. SPECIALIZED TRANSDUCTION
  - a. ONLY CERTAIN GENES TRANSFERRED
  - b. PHAGE INTEGRATION & EXCISION - TEMPERATE PHAGE
3. GENERALIZED TRANSDUCTION
  - a. ALL GENES TRANSFERRED
  - b. PHAGE DNA REPLICATION MISTAKES