1.89, Environmental Microbiology
Prof. Martin Polz
**Lecture 21**

## Indicator Organisms

Concept: Certain non-pathogenic bacteria and viruses occur naturally in the feces of warm-blooded animals.
↳ Use as indicators of fecal contamination.

- Total coliforms: Escherichia, Citrobacter, Enterobacter, Klebsiella

  ↳ Definition: aerobic, facultative anaerobic, G⊖ bacteria that produce gas and acid upon lactose fermentation within 48 hours at 35° C.

  ↳ 3 common methods for testing:
  1. MPN test (Most Probable Number test)
     3 Steps:
     a. presumptive test (identifies P/A)
     b. confirmatory test
     c. complete test (double-check)

  2. MF test (Membrane Filtration)

  3. P/A test (Presence/Absence)
     ~ not quantitative
     ~ typically utilizes color indicators

- Fecal Coliforms: Escherichia, Klebsiella

  ↳ Can carry out lactose fermentation at temperatures up to 44.5° C in 24 hours

  - E. coli: β- glucuronidase

- Fecal Streptococci: Enterococcus, Streptococcus

  ↳ Definition: $G^+$ bacteria; can tolerate 6.5% NaCl, a pH of upto 9.6 at 45°C.

- Clostridium Perfringens

  ↳ Definition: Sulfite-reducing anaerobe; forms spores-spores are tolerant to heat

- Bacteriophages

  ↳ Bacterial + viral indicators
  Example: Somatic colifages
  F-specific RNA coliphages