

Gram-positive Foodborne Microorganisms 10/16/2014

- o B. Aerobic or facultatively anaerobic sporeformers
 - 1. Genus *Bacillus* ("**Small Staff**") (*B. cereus*, *B. subtilis*, *B. anthracis*) family bacilliaceae
 - a) Foodborne pathogen: *B. cereus* (**foodborne intoxication**; most common amongst *Bacillus* foodborne disease)
 - spore does not distend the mother cell
 - o (1) *B. mycooides*: enterotoxin-producing species associated mainly with milk; pasteurized milk improperly stored temperature wise, cross-contamination
 - o *B. thuringiensis*: may produce disease via enterotoxin secretion; **toxico-infection**; some are **plant pathogens** but some strains are known to secrete enterotoxins
 - Very similar to *B. cereus*
 - o (2) Toxins produced: enterotoxin, emetic toxin
 - (a) Chemical similarity to *Clostridium perfringens* toxins
 - (b) Hemolysin BL (HBL): primary diarrheal toxin
 - (c) Diarrheal disease (Enterotoxin):
 - i) Short duration, generally without fever
 - ii) Foodborne transmission: cereals, meats, dairy, grains
 - iii) Some vomiting, diarrhea, cramping
 - **Enterotoxin (toxico-infection)**
 - (d) **Emetic toxin (intoxication)**
 - i) More severe symptoms: severe vomiting
 - ii) 1-6 hr incubation period post ingestion
 - iii) similar to Staphylococcal GI intoxication symptoms

- *thermophilic flat sour spoilage, canned low-acid foods*
 - *canning can kill the vegetative cells but some spores will not be killed*
 - *visual and textural defects*
 - *mostly problematic in high starch, neutral pH, plant derived foods*
- o C. Obligately anaerobic sporeformers
- 1. Genus ***Clostridium*** (*C. botulinum*, *C. perfringens*)
 - a) ***C. botulinum***: Causative agent, foodborne botulism (as well as other forms of botulism)
 - obligate, strict anaerobic fermentative rods
 - mesophilic, thermophilic, psychrotrophic species and strains exist in genus
 - spore distends mother cell
 - “sausage disease/death” - botulism first described in early 1200’s associated with euro style blood sausages
 - o (1) Strains are classified based on neurotoxin synthesis (7 toxin serotypes: A, B, C, D, E, F, G)
 - **Toxin type A is most problematic for human disease**
 - (a) Group I: proteolytic strains (mostly prob. for meats)
 - (b) Group II: non-proteolytic strains
 - (c) Group III: toxin types C, D
 - (d) Group IV: toxin type G
 - o (2) Microbe growth:
 - (a) **Nutritionally Fastidious** with respect to nutrients: complex nutrients must be provided by environment/food for growth, toxin production in simple form
 - (b) Temperatures: 10-50°C observed as optimal, but environment has impact on growth (No growth at refrigeration!)