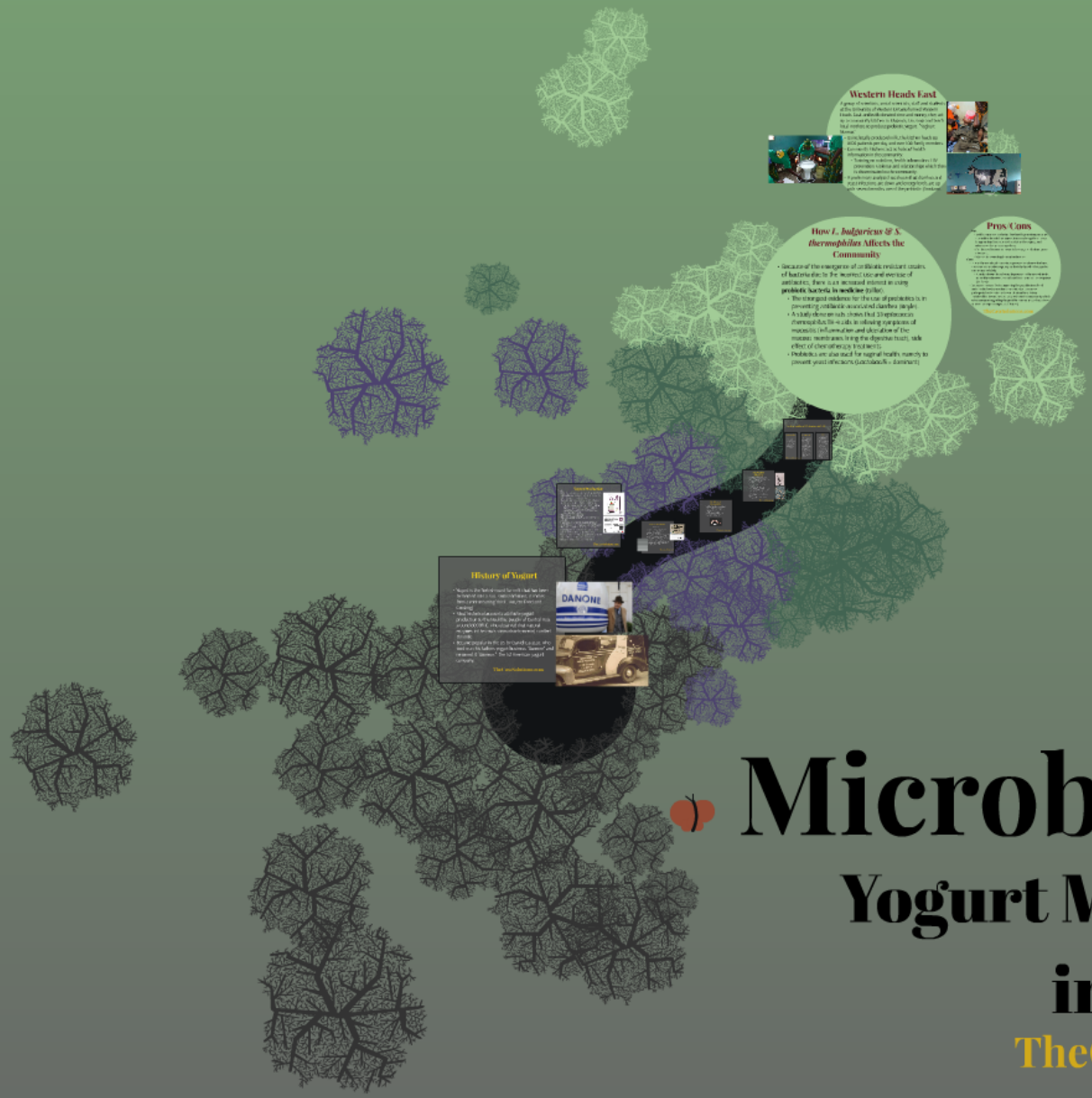

Microbes in Yogurt

Yogurt Mamas: Probiotics in Tanzania

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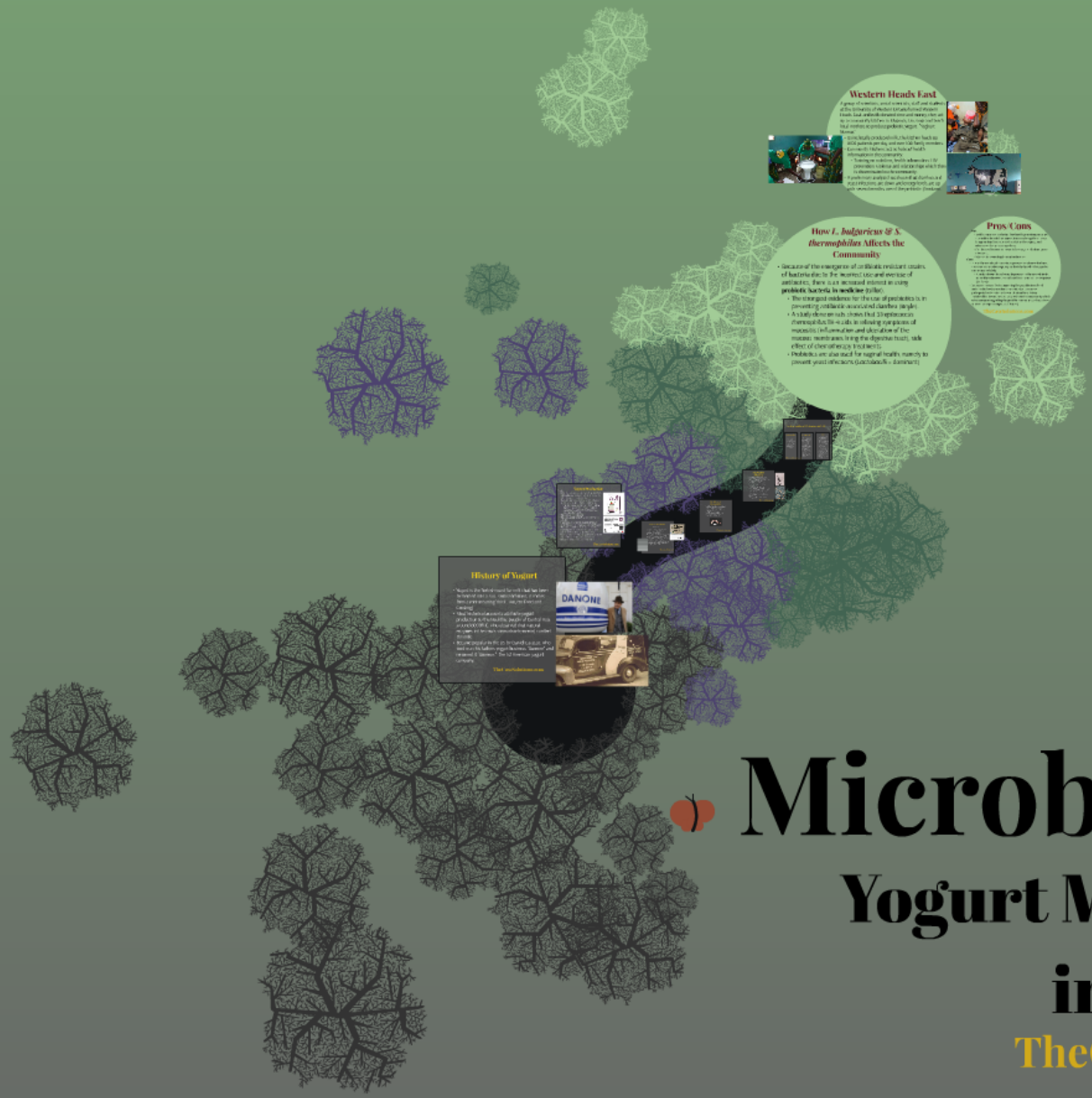

Microbes in Yogurt

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History of Yogurt

- Yogurt is the Turkish word for milk that has been fermented into a tart, semisolid mass; it comes from a root meaning 'thick'. (48, On Food and Cooking)
- Most historical accounts attribute yogurt production to the Neolithic people of Central Asia around 6000B.C. who observed that natural enzymes in the cow's stomach (chymosin) curdled the milk
- Became popular in the US by Daniel Carasso, who took over his fathers yogurt business "Danone" and renamed it "Dannon," the 1st American yogurt company.

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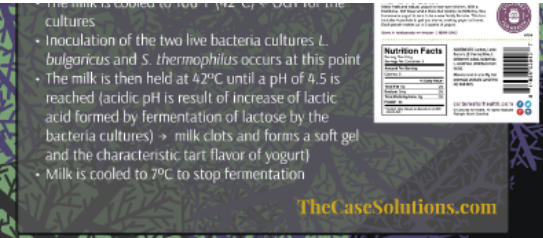
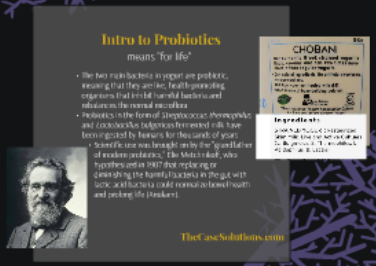
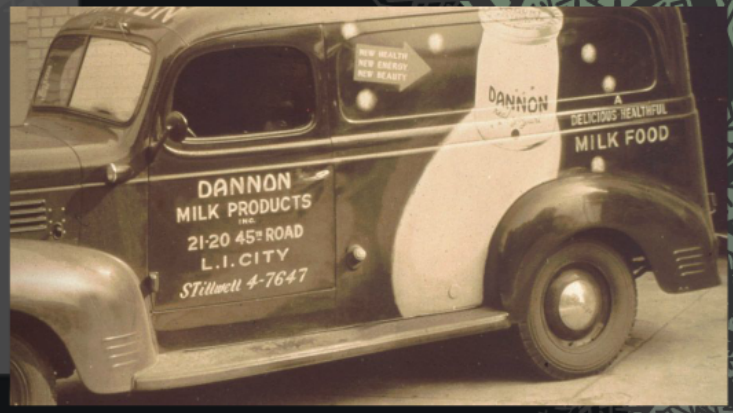


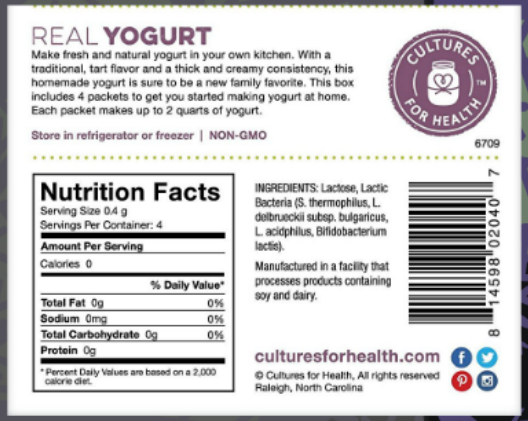




Yogurt Production

7 steps:

- Milk composition is adjusted by adding dry milk to adjust whey protein (solid) content, while cream is added to adjust the amount of fat
- The milk mixture is pasteurized at 185°F (85°C) for 30 minutes or at 203°F (95°C) for 10 minutes.
  - Spoilage microorganisms are killed, providing a better environment for the starter cultures (*Lactobacillus bulgaricus* & *Streptococcus thermophilus*) to grow
- The milk is mixed thoroughly
- The milk is cooled to 108°F (42°C) ← OGT for the cultures
- Inoculation of the two live bacteria cultures *L. bulgaricus* and *S. thermophilus* occurs at this point
- The milk is then held at 42°C until a pH of 4.5 is reached (acidic pH is result of increase of lactic acid formed by fermentation of lactose by the bacteria cultures) → milk clots and forms a soft gel and the characteristic tart flavor of yogurt)
- Milk is cooled to 7°C to stop fermentation


REAL **YOGURT**

Make fresh and natural yogurt in your own kitchen. With a traditional, tart flavor and a thick and creamy consistency, this homemade yogurt is sure to be a new family favorite. This box includes 4 packets to get you started making yogurt at home. Each packet makes up to 2 quarts of yogurt.

Store in refrigerator or freezer | NON-GMO

6709

Nutrition Facts

Serving Size 0.4 g
Servings Per Container: 4

Amount Per Serving	
Calories 0	
	% Daily Value*
Total Fat 0g	0%
Sodium 0mg	0%
Total Carbohydrate 0g	0%
Protein 0g	

* Percent Daily Values are based on a 2,000 calorie diet.

INGREDIENTS: Lactose, Lactic Bacteria (S. thermophilus, L. delbrueckii subsp. bulgaricus, L. acidphilus, Bifidobacterium lactis).

Manufactured in a facility that processes products containing soy and dairy.

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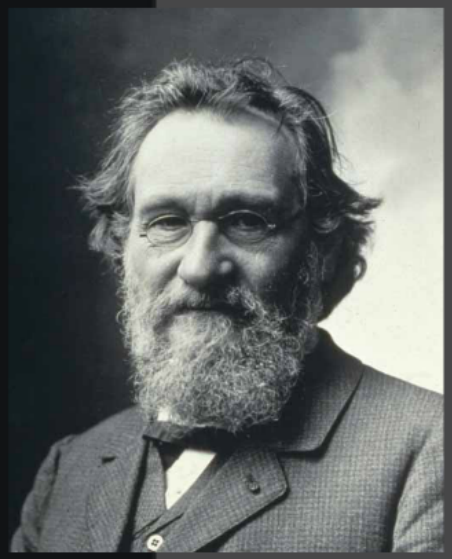
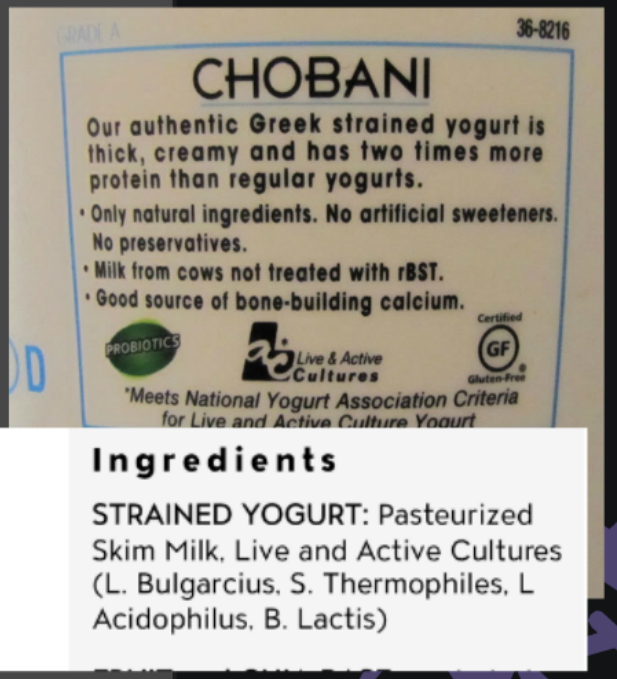
Intro to Probiotics

means "for life"

- The two main bacteria in yogurt are probiotic, meaning that they are live, health-promoting organisms that inhibit harmful bacteria and rebalances the normal microflora
- Probiotics in the form of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* fermented milk have been ingested by humans for thousands of years
    - Scientific use was brought on by the "grandfather of modern probiotics," Elie Metchnikoff, who hypothesized in 1907 that replacing or diminishing the harmful bacteria in the gut with lactic acid bacteria could normalize bowel health and prolong life (Anukam).





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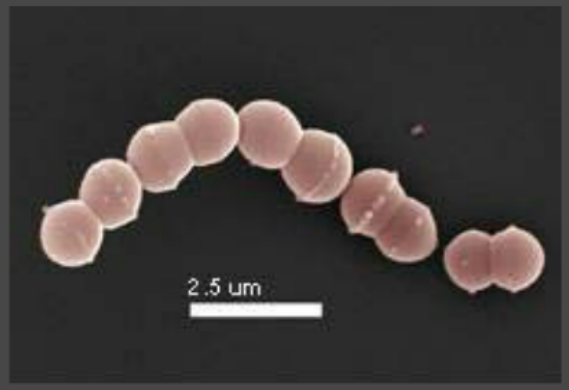
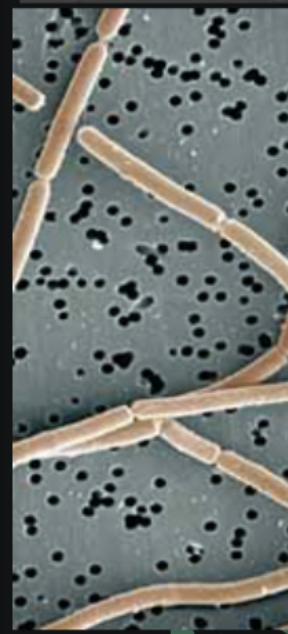
Streptococcus thermophilus

- A Gram-positive lactic acid producing cocci-shaped bacterium that occurs in chains.
- Likes warmer environments, as the name implies. OGT ~ 42°C
- A leading probiotic in yogurt
- Known to promote gastrointestinal health
- Discovered by Elie Metchnikoff



Lactobacillus bulgaricus

- A Gram-positive rod-shaped lactic acid bacterium that occurs in pairs or chains
- Is also thermophilic, having an OGT of ~ 43°C
- A leading probiotic in yogurt
- Considered a symbiotic microbe, lives in beneficial symbiosis with the intestinal microflora
- Can withstand acidic stomach juices
- *Lactobacilli* are the dominant microorganism in the vagina (Boriello). It is said that eating yogurt may replenish the *Lactobacilli* and decrease the chance of the overgrowth of other present microbes such as *Candida albicans*.
- Discovered by Bulgarian microbiologist, Stamen Grigorov



S. thermophilus & L. bulgaricus in the GI

S. thermophilus

- *Streptococcus thermophilus* lacks genes which contain surface proteins. Therefore, pathogens cannot attach and hide from the body's defensive actions (Probiotic.org).

L. bulgaricus

- Displays a proven ability to draw away toxins and defeat harmful bacteria, while colonizing the intestinal mucosa in a beneficial symbiosis (Probiotic.org).
- Blocks pathogen adhesion sites in the mucous layer of the intestine (Probiotic.org).
- A study showed that all of *Lactobacillus bulgaricus* strains exhibited antimicrobial activity against *Escherichia coli.* (Akpinar).

Both

- Secrete natural antimicrobial substances that inhibit and outcompete the growth of harmful microorganisms.
  - Ex: Bacteriocins are antimicrobial peptides that are active against other bacteria, principally closely related species that compete for the same nutrients (Parada).
  - Mode of action = pore formation in cell membrane and inhibition of cell wall synthesis.
- Both poduce lactic acid, which permeablizes bacteria by disrupting the outer membrane (low pH makes organic acids lipossoluble)
  - The acidic pH also inhibits many bacteria

Pros/Cons

Pros:

- Both bacteria are probiotics, live health-promoting microbes that inhibit harmful pathogens from inhabiting the mucosal linings of the GI tract as well as that of the vagina, and rebalances the normal microflora.
- Can be used to treat or prevent illnesses, i.e. diarrhea, yeast infections..
- May aid in preventing lactose intolerance

Cons:

- Due to the inability of probiotic organisms to colonize the host, they need to be taken regularly so that the benefits they confer can be accrued daily
  - A study showed that dietary deprivation of fermented foods in healthy volunteers caused a fall in innate immune response (Anukam).
- An area of concern "exists regarding the possible transfer of antimicrobial resistance from probiotic strains to more pathogenic bacteria in the intestinal microbiota. Many Lactobacillus strains are naturally resistant to vancomycin, which raises concerns regarding the possible transfer of such resistance to more pathogenic organisms" (Boyle).