

PROBIOTICS

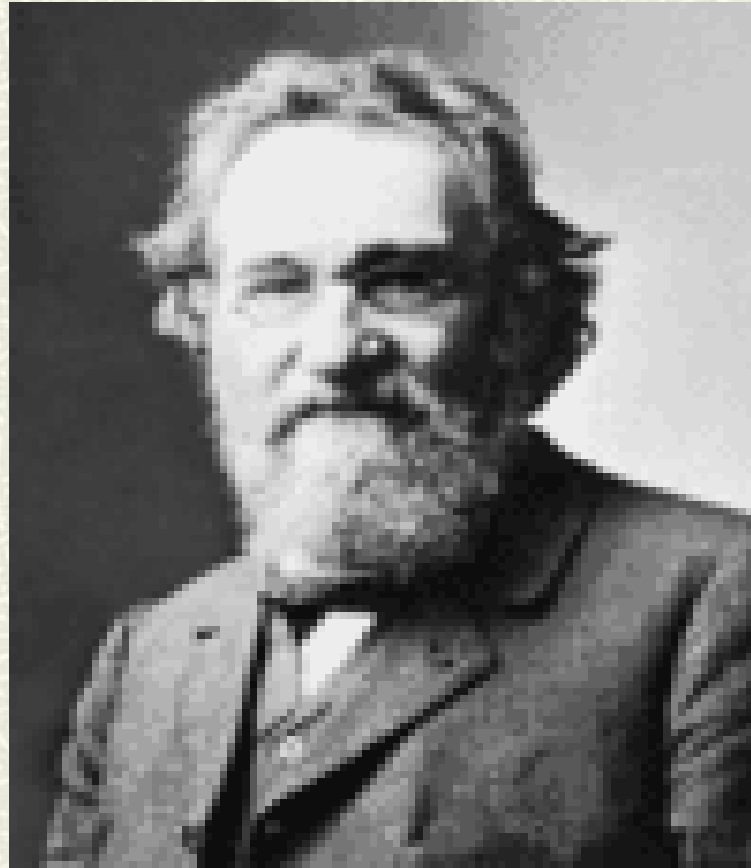


Definition

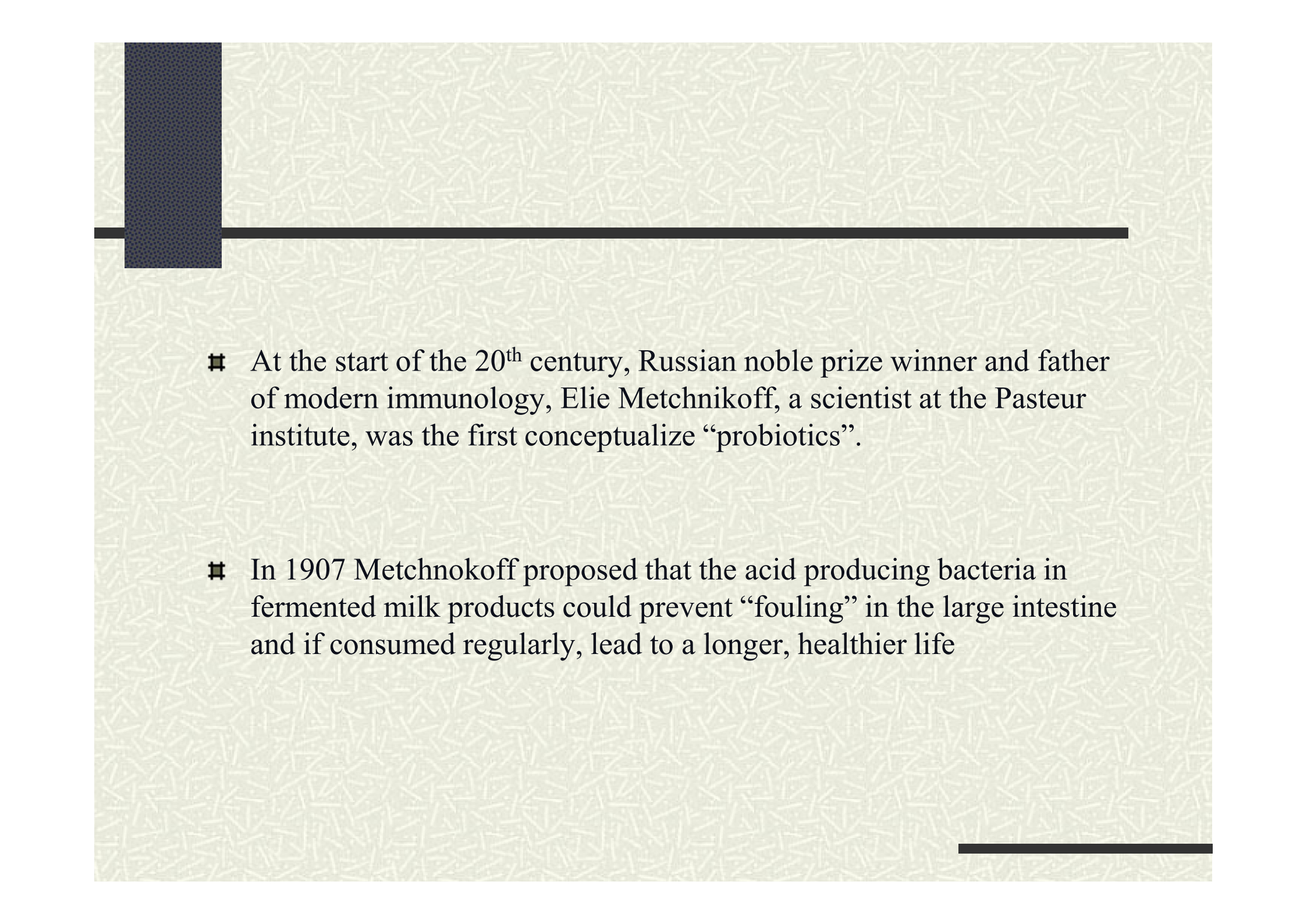


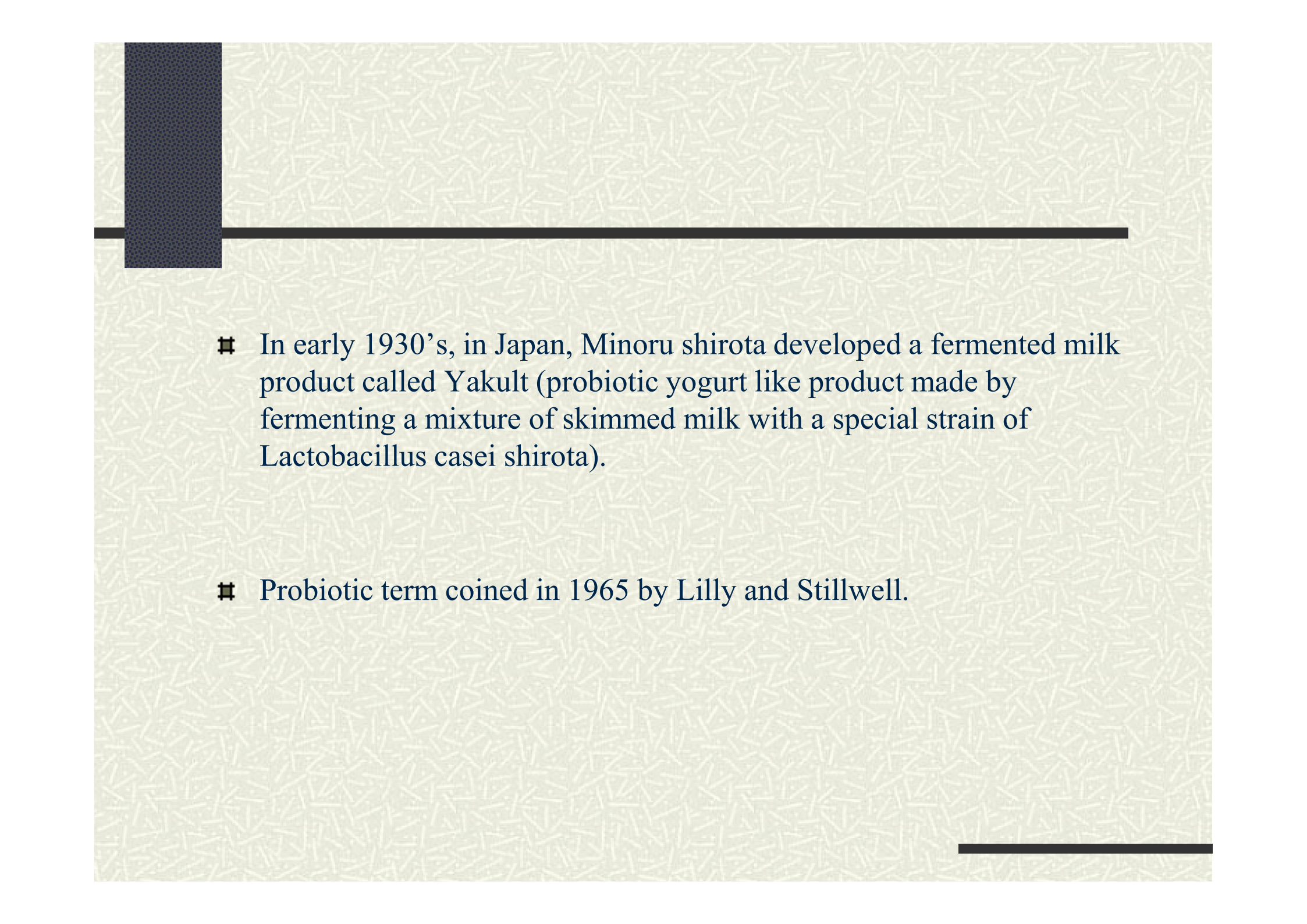
Live microbial feed supplements that have beneficial effects on the host by improving its intestinal microbial balance.

HISTORY



Elie Metchnikoff

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- # At the start of the 20th century, Russian noble prize winner and father of modern immunology, Elie Metchnikoff, a scientist at the Pasteur institute, was the first to conceptualize “probiotics”.
 - # In 1907 Metchnikoff proposed that the acid-producing bacteria in fermented milk products could prevent “fouling” in the large intestine and if consumed regularly, lead to a longer, healthier life.

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- # In early 1930's, in Japan, Minoru shirota developed a fermented milk product called Yakult (probiotic yogurt like product made by fermenting a mixture of skimmed milk with a special strain of *Lactobacillus casei shirota*).
 - # Probiotic term coined in 1965 by Lilly and Stillwell.

Newborn Microbiota

Initially depends on

- ❏ Mother's microbiota maternal vaginal and intestinal flora constitutes the source of bacteria, which colonizes the intestine of new born.
- ❏ Mode of deliver
- ❏ Birth environment
- ❏ Rarely genetic factors
- ❏ After infancy probiotics supplied from raw foods; such as lactic acid fermented foods such as yogurt, cheese and probiotic supplements.

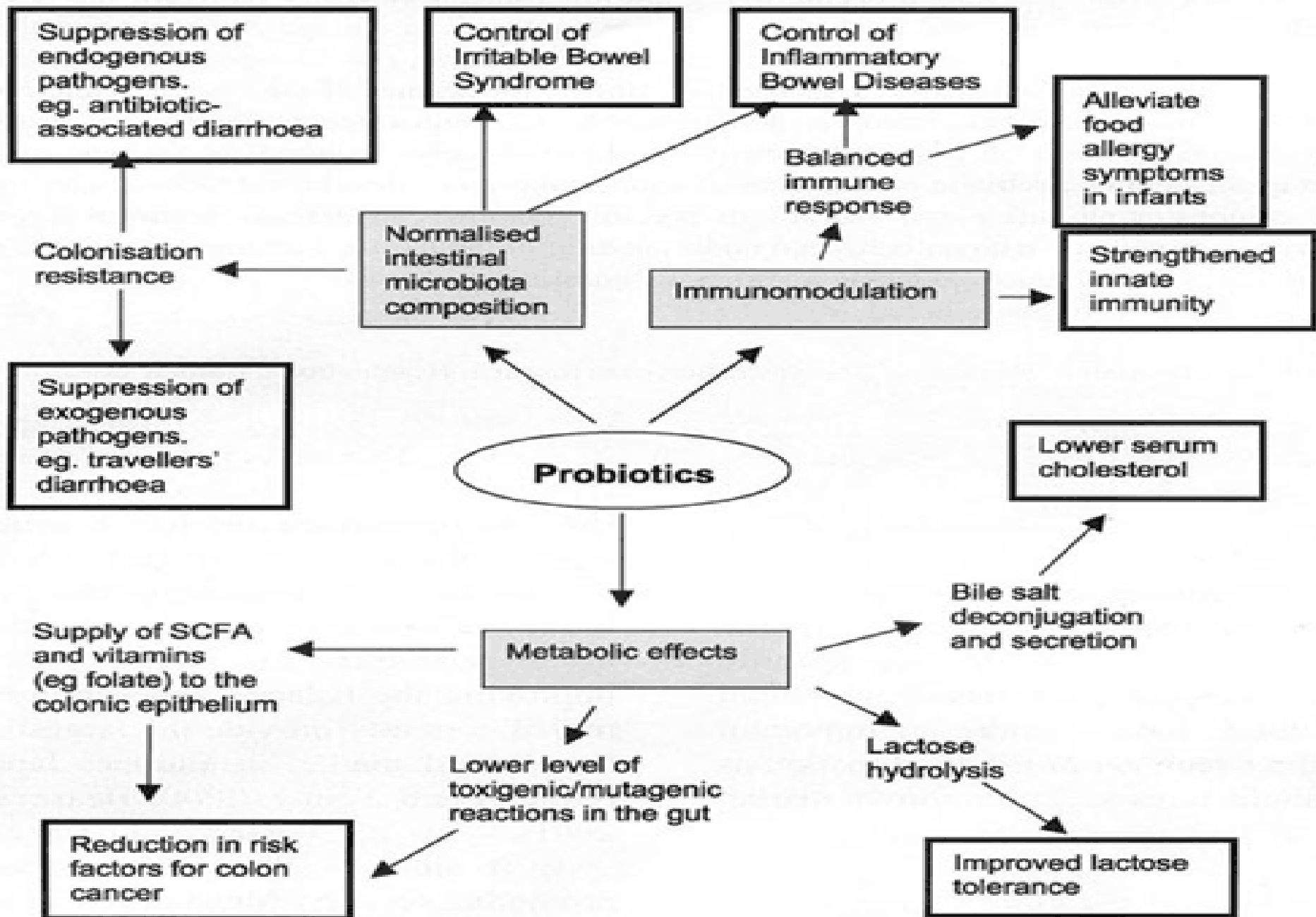


Factors affecting the intestinal micro ecosystem

- # Antibiotics and other drug intake
 - # Microbial infections
 - # Diet (highly processed, low fiber foods)
 - # Chronic diarrhea
 - # Stress
 - # Chlorinated water
 - # Radiation and chemotherapy
 - # Colonic therapies for detoxification
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Characteristics of Effective Probiotics

- # Able to survive the passage through the digestive system.
 - # Able to attach to the intestinal epithelia and colonise.
 - # Able to maintain good viability.
 - # Able to utilise the nutrients and substrates in a normal diet.
 - # non pathogenic and non toxic.
 - # Capable of exerting a beneficial effect on the host.
 - # Stability of desired characteristics during processing, storage and transportation.
 - # Anti-inflammatory, antimutagenic, immunostimulatory.
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Proposed health benefits stemming from probiotic consumption.

Advantages

- # Produce lactic acid- lowers the pH of intestines and inhibiting bacterial villains such as *Clostridium*, *Salmonella*, *Shigella*, *E. coli*, etc.
- # Decreases the production of a variety of toxic or carcinogenic metabolites.
- # Aid absorption of minerals, especially calcium, due to increased intestinal acidity.
- # Production of β - D- galactosidase enzymes that break down lactose.
- # Produce a wide range of antimicrobial substances -acidophilin and bacteriocin etc. help to control pathogenic bacteria .
- # Produce vitamins (especially Vitamin B and vitamin K)
- # Act as barriers to prevent harmful bacteria from colonizing the intestines

Colon cancer – Certain probiotics (*Lactobacillus bulgaricus*) may help prevent colon cancer by preventing the breakdown of enzymes (β - glucuronidase) that contribute to the growth of cancer causing agents.



Lowering cholesterol -

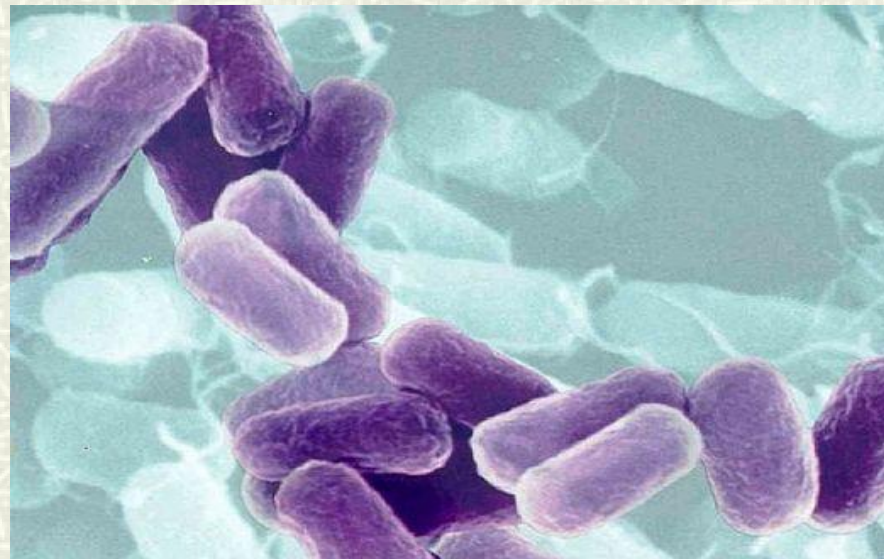
a range of LAB able to break down bile in the gut, thus inhibiting its reabsorption (which enters the blood as cholesterol)



Blood pressure reduction -Consumption of milk fermented with various strains of LAB may result in modest **reductions in blood pressure**, due to the ACE inhibition-like peptides produced during fermentation.

Antibiotic associated diarrhea(AAD)-

1. Results from an imbalance in the colonic microbiota
2. Probiotic treatment can reduce the incidence and severity of AAD
3. Efficacy of probiotic AAD prevention is dependent on the probiotic strain(s) used and on the dosage.



Treat allergy –

1. Degradation/structural modification of enteral antigens.
2. Normalization of the properties of aberrant indigenous microbiota and of gut barrier functions.
3. Regulation of the secretion of inflammatory mediators, and promoting development of the immune system.
4. Prevents food allergy by promoting endogenous barrier mechanisms and alleviating intestinal inflammation.
5. Stimulating immune response and reduction of serum IgE levels.
6. Reduction of Th2 cytokine response.

Probiotic strains

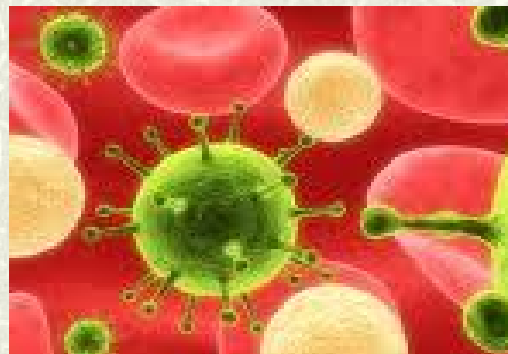
Lactobacillus species

- # *L. acidophilus*
- # *L. plantarum*
- # *L. casei subspecies rhamnosus*
- # *L. brevis*
- # *L. delbreuckii subspecies bulgaricus*



Bifidobacterium species

- # *B. adolescentis*
- # *B. bifidum*
- # *B. longum*
- # *B. infantis*
- # *B. breve*



Others

- # *Streptococcus salivarius* ssp. *thermophilus*
- # *Lactococcus lactis* ssp. *lactis*
- # *Lactococcus lactis* ssp. *cremoris*
- # *Enterococcus faecium*
- # *Leuconostoc mesenteroides* ssp. *dextranicum*
- # *Propionibacterium freudenreichii*
- # *Pediococcus acidilactici*
- # *Saccharomyces boulardii*



Intestinal Microflora: Location & Prevalence

- # Rare in the esophagus
 - # Uncommon in the stomach
 - primarily gram (+)
 - $10^2 - 10^4$
 - # 10^5 in the jejunum – primarily aerobes
 - # $10^{10} - 10^{12}$ in the colon
 - primarily anaerobes
 - 1000x more anaerobes than aerobes
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Probiotic Consumption

- # Minimum Consumption: 100g of a probiotic food with 10^7 cfu/ g.
 - # most probiotics do not permanently adhere in the intestine, but exert their effects as they metabolize and grow during their passage through the intestine (colonization). Thus, daily consumption of these bacteria is probably the best way to maintain their effectiveness
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Probiotic Foods

Yogurt

- # Usually made from milk (rarely, from cream) inoculated with *Streptococcus thermophilus* and either *Lactobacillus acidophilus* or *Lactobacillus bulgaricus*.
- # Turkish in origin
- # Available in innumerable forms and flavors
 1. Lowfat chocolate yogurt
 2. Drinkable fruit-flavored goat yogurt
 3. Neon-colored yogurt in squeeze tubes



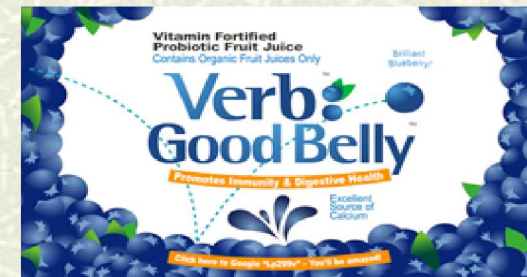
Frozen Yogurt



LaLoo's Goat's Milk Frozen Yogurt, naturally chock-full of *S. Thermophilus*, *L. Bulgaricus*, *L. Acidophilus* and *Bifidus*.

Juice

- # *First probiotic juice launched in the fall of 2007 by Next Foods.*
- # *Goodbelly, organic fruit juice-based probiotic beverage, contains L.Plantarum 299v, has effects on irritable bowel syndrome*
- # *Three initial flavors include Brilliant Blueberry, Peach Mango and Strawberry Rosehip*





Attune Foods:Chocolate & Granola bars

- # Attune makes Wellness Bars in three chocolate varieties and three yogurt and granola varieties.
- # All products contain “more than 5 times the live active cultures in yogurt, with less sugar.

Kashi Vive Probiotic Digestive Wellness Cereal

Vive contains one billion CFUs of *Lactobacillus acidophilus* per serving.



Yakult Dairy Drink

- # Probiotic, cultured dairy beverage
- # Has citrus flavor
- # Sold in single-shot containers that contain around 8 billion live and active *Lactobacillus casei Shirota* cells per bottle



Ricera Rice Yogurt

An organic, non-dairy, rice “yogurt” with whole grains and live, active cultures, including *Lactobacillus bulgaricus*, *Streptococcus thermophilus*, *Lactobacillus acidophilus* and *Bifidobacterium bifidum*.



Dosage Forms...For the Military

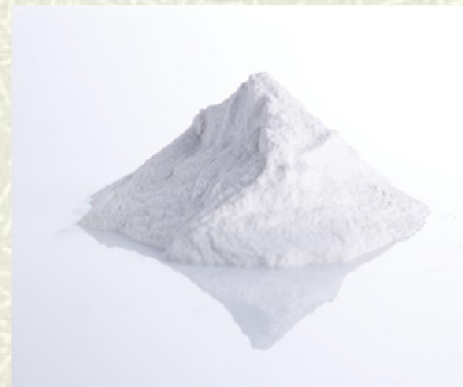
Standard forms:

- Capsules
- Sticks
- Powder blends
- Chewable tablets



Individual customization:

- Capsules
- Sticks
- Chewable tablets
- Sachets
- Tablets



and more upon request...

Food Better Choice

DUE TO-

- # synergistic effect between components of foods and probiotic cultures.
 - # The natural buffering of stomach acid by food also enhances the stability of consumed probiotics.
 - # Dairy products containing probiotics provide a number of high quality nutrients including calcium, protein, bioactive peptides, sphingolipids, and conjugated linoleic acids.
 - # incorporating foods containing probiotics into daily food choices can become a lifestyle habit
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Multi-Probiotics

Research emerging on potential health benefits of multiple probiotic strains as a health supplement as opposed to a single strain.

1. Multibionta

Lactobacillus gasseri PA16/8, Bifidobacterium bifidum MF20/5, Bifidobacterium longum SP07/3

2. Acidophilus Pearls

Lactobacillus acidophilus, Bifidobacterium longum

3. Kyo-Dophilus

Lactobacillus acidophilus, Bifidobacterium bifidum, Bifidobacterium longum

4. Symprove live activated probiotic

Lactobacillus plantarum, Lactobacillus acidophilus, Lactobacillus Casei, var. Rhamnosus, Enterococcus faecium, all in active state not freeze-dried

Side Effects of Probiotics

- # Rare cases cause bloating, diarrhea, abdominal pain.
 - # If in excess cause infection that require medical attentions.
 - # People having on underlying disease or compromised immune system cause potential health problems like skin rash, fever, bloody stools etc.
 - # Sometimes interact with immunosuppressive drugs leading to life threatening conditions. So people taking such drugs should avoid it.
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Prebiotics

- # A prebiotic is a nondigestible component which beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of colonic bacteria, thereby improving the health of the host .
 - # Examples- insulin, garlic, onions, chicory root, Asparagus, whole wheat, rye, barley
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Characteristics of Prebiotics

- # Should not be hydrolysed or absorbed in the upper part of G.I tract.
 - # Should be a selective substrate for one or a limited number of potentially bacterial commercial to the colon culture protagonist.
 - # Should be able to alter the colonic microflora towards a healthier composition or selectively stimulates the growth and or activity of intestinal bacteria associated with health and well being.
 - # Should help increase the absorption of certain minerals such as calcium and magnesium.
 - # Favourable effect on the immune system and provide improved resistance against infection.
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Synbiotics

- ✦ PROBIOTICS + PREBIOTICS
 - ✦ Foods containing the combination of probiotics and prebiotics are referred to as sybiotics.
 - ✦ Improved survival in upper GIT and more efficient implantation.
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Institutes engaged in Probiotic research in India



Central Food Technology And Research Institute,
Mysore, India



National dairy research institute, Karnal, Haryana, India



Institute of microbial technology, Chandigarh, India



National dairy development board, Anand, Gujarat,
India



Nestle Pvt Ltd, Panipat, Haryana, India

Probiotics Revolution Begins

A habit
that can really benefits
our overall health-
“TAKING PROBIOTICS”

