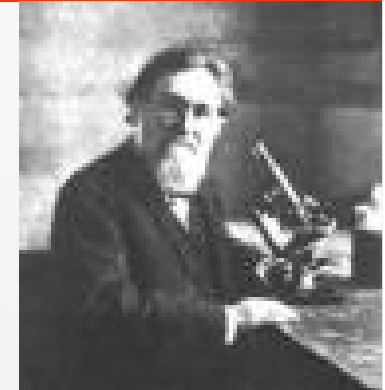


# Definitions

## Probiotic:

**Greek: Pro bios = „For life“**

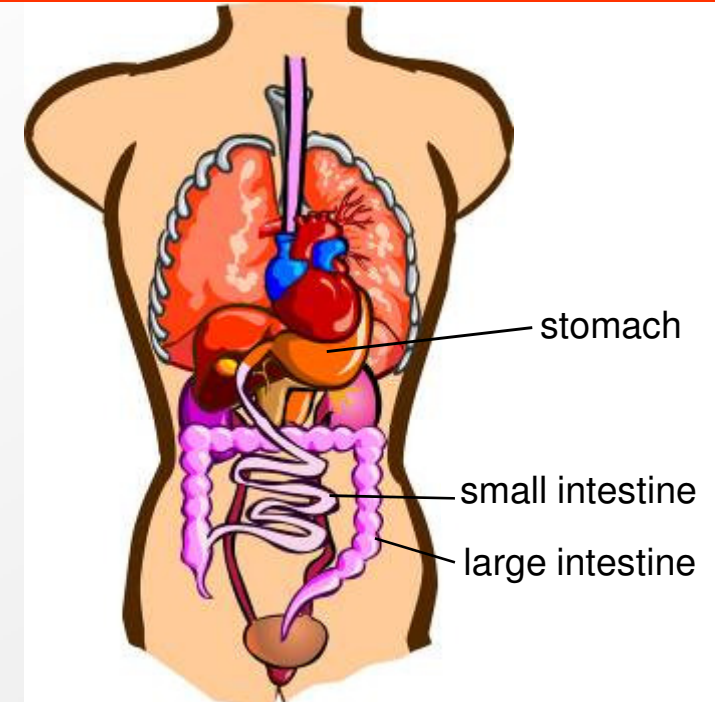


- |      |              |  |
|------|--------------|--|
| 1907 | Metchnikoff: | Prolongation of life by consumption of yoghurt   |
| 1954 | Vergio:      | Used probably as first the term „probiotic“  |
| 1998 | Salminen:    | „A <b>live</b> microbial food ingredient that is beneficial to <b>health</b> “   |
| 2002 | EFFCA*:      | „Probiotics are <b>living microorganisms</b> (bacteria or yeasts), which, when ingested or locally applied in sufficient numbers confer one or more specified <b>demonstrated health benefits</b> for the consumer.“ |

\*European Food & Feed Cultures Association

# Importance of human intestinal flora

- intestinal mucous surface: 400 m<sup>2</sup>
- >85% of the immune system are mucosa associated
- 10<sup>14</sup> micro-organisms in the gut
- around 500 different species in the gut
- 99% of the bacteria come from 30-40 species



- many bacteria have no known function, some are potentially detrimental, others are beneficial

# Roles of different bacteria in the gut

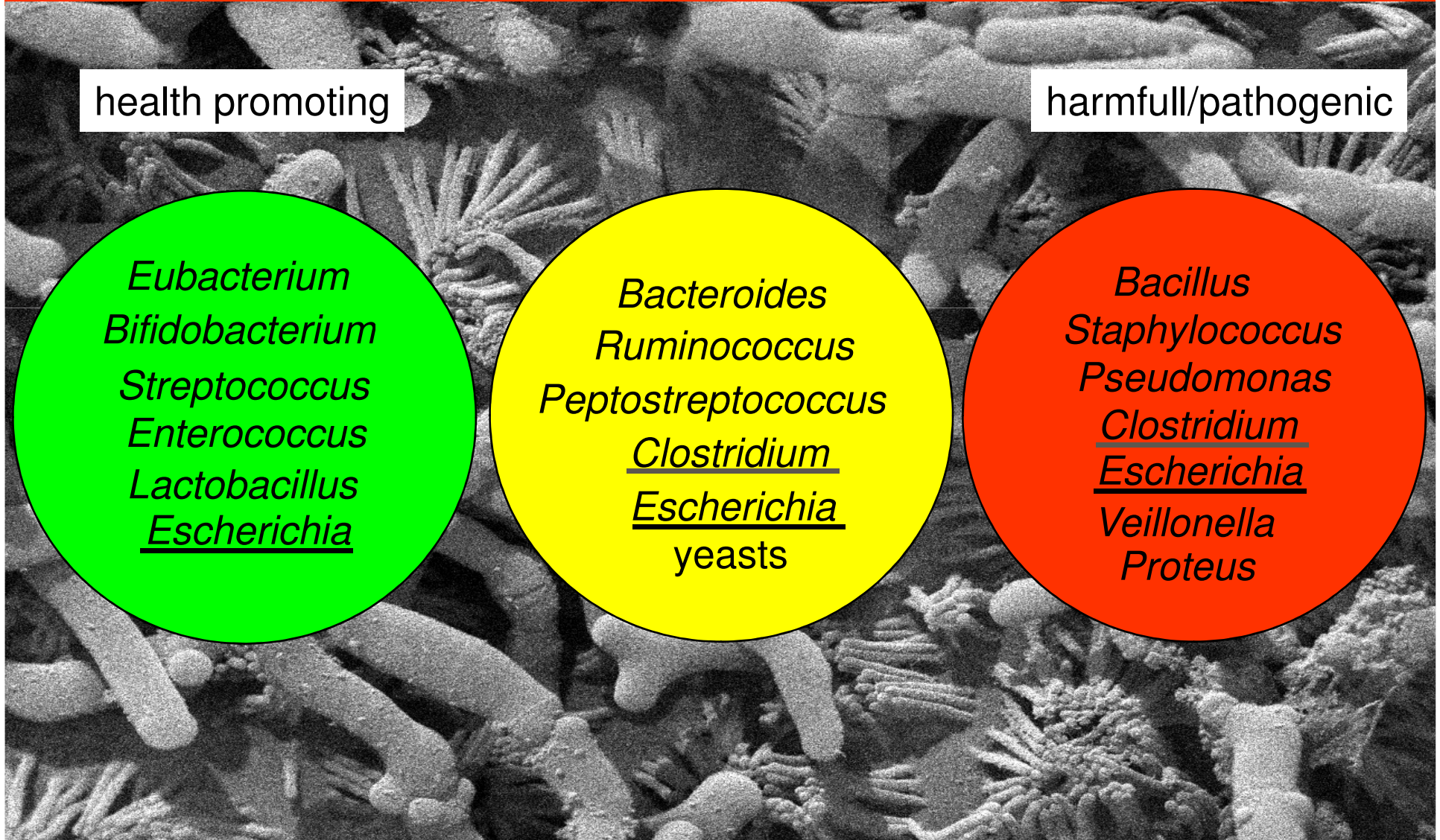
health promoting

harmfull/pathogenic

*Eubacterium*  
*Bifidobacterium*  
*Streptococcus*  
*Enterococcus*  
*Lactobacillus*  
*Escherichia*

*Bacteroides*  
*Ruminococcus*  
*Peptostreptococcus*  
*Clostridium*  
*Escherichia*  
yeasts

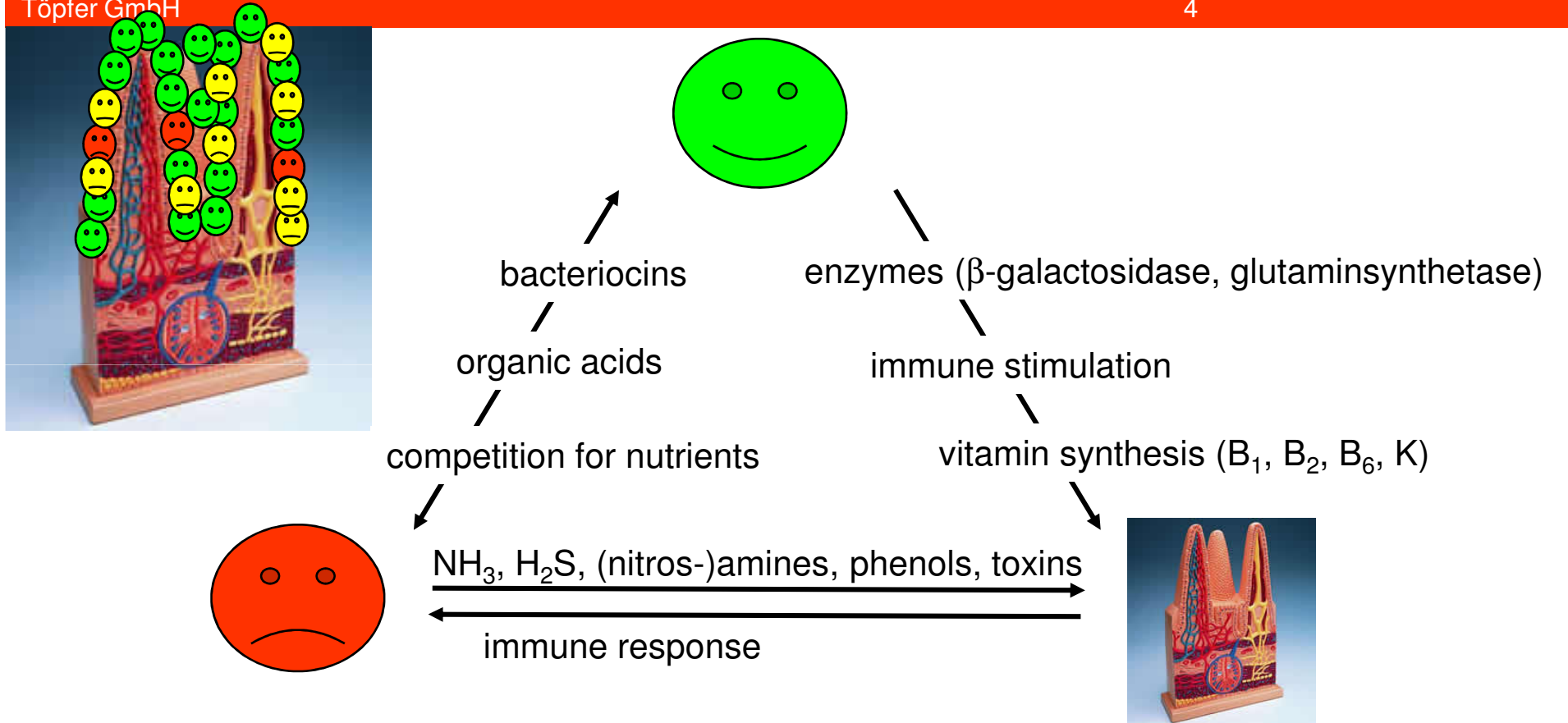
*Bacillus*  
*Staphylococcus*  
*Pseudomonas*  
*Clostridium*  
*Escherichia*  
*Veillonella*  
*Proteus*



# Interactions in the intestine

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➔ **Complex ecosystem**

➔ **Delicate balance is e.g. influenced by diet and antibiotic treatment**

# Infants:

## Even higher importance of health promoting flora

### Immature immune system

#### Weak barrier function:

- Less acidic stomach
- Less bile in duodenum

 Relatively unprotected

#### Higher incidence of:

- Urinary tract infections
- Septicemia
- Diarrhoea
- Enteritis



#### Health promoting bacteria:

- Immunological tolerance & maturation
- Protection against pathogen adhesion/translocation
- Acid production: inhibition of mucolytic enzymes / pathogens
- Antibacterial compounds

## Infant: intestinal flora


Infants receive their **predominant bifidobacterial flora** normally from mother **during birth**

Obstacles:

- Wrong vaginal colonisation
- Caesarean section
- Antibiotic treatment

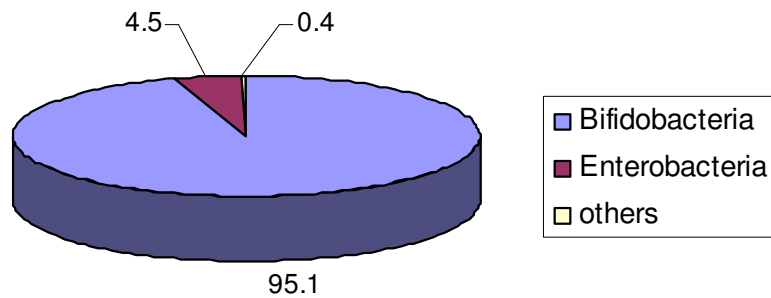
Further inoculation:            During breast-feeding

Obstacle:                        Exaggerated hygiene

 **Dominating species in infants: *B. breve*, *B. infantis*, *B. longum*, *B. bifidum***

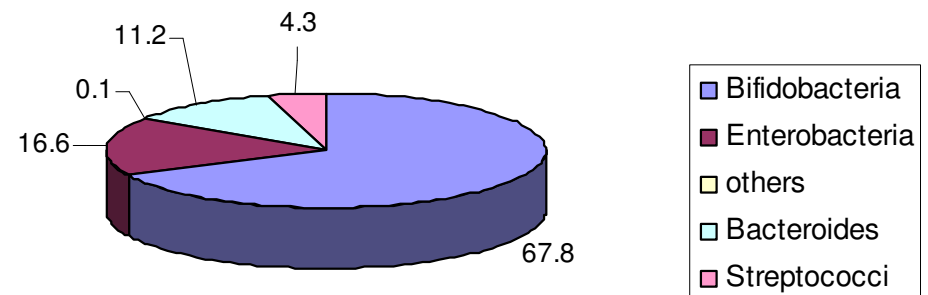
# Infant: intestinal flora

**Breast-fed**



Others: Bacteroides, Streptococci, Staphylococci, Lactobacilli

**Bottle-fed**



Others: Lactobacilli, Staphylococci

Formula without bifidumbacteria

- ➔ Breast-fed infants: Bifidobacteria dominate the flora (up to 99%)
- ➔ Bottle-fed infants: Complex flora (formula without bifidumbacteria)
- ➔ Intestinal flora is regarded as one reason for higher resistance of breast-fed infants (e.g. Howie PW *et al.*, 2002)

# Probiotic infant formula



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1966 Töpfer launched Lactana<sup>®</sup>B ,  
an infant formula with living bifidobacteria,  
the result of intensive research in collaboration with  
Prof. Dr. J.B. Mayer, University hospital Homburg/Saar

- ➔ **First German bifidogenic infant formula**
- ➔ **Töpfer products contain the 4 different species**
- ➔ **Natural inhabitants of infant intestinal flora**
- ➔ **Product development based on mother nature**

