

A warm, golden sunset over a field of tall grasses with mountains in the background. The sun is low on the horizon, creating a soft, hazy glow. The grasses in the foreground are in sharp focus, while the mountains in the distance are silhouetted against the bright sky. The overall mood is peaceful and serene.

“Microbes in human welfare”

\* Microbes are diverse - protozoa, bacteria, fungi, viruses, viroids and also prions  
(Proteinaceous infectious agents)

\* Microbes like bacteria and fungi can be grown in nutrient media to form colonies and can be seen in naked eyes.

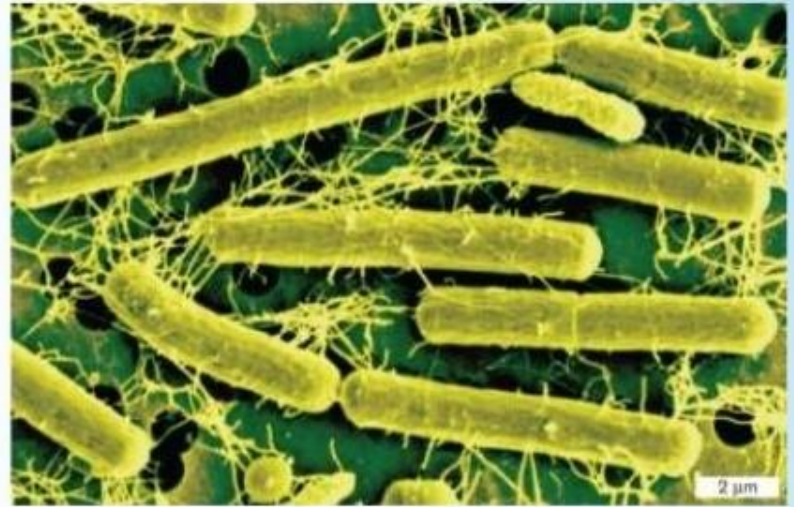
\* Some microbes' causes diseases and some are useful for human being.





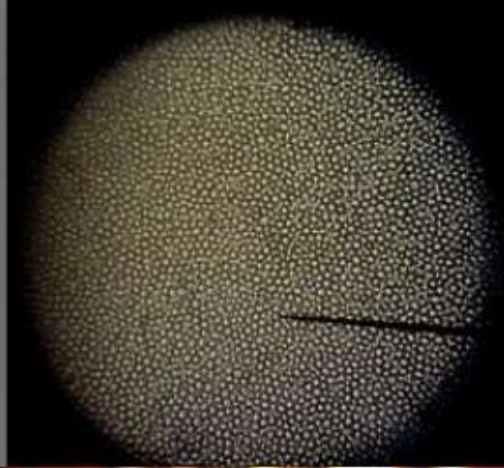
# Microbes in Household products

- ❖ A common example is the production of curd from milk.
- ❖ Micro-organisms such as *Lactobacillus* and others commonly called Lactic Acid Bacteria (LAB) grow in milk and convert it to curd.
- ❖ During growth, the LAB produces acids that coagulate and partially digest the milk proteins.
- ❖ It also improves its nutritional quality by increasing vitamin B12.
- ❖ In our stomach too, the LAB play very beneficial role in checking disease causing microbes.





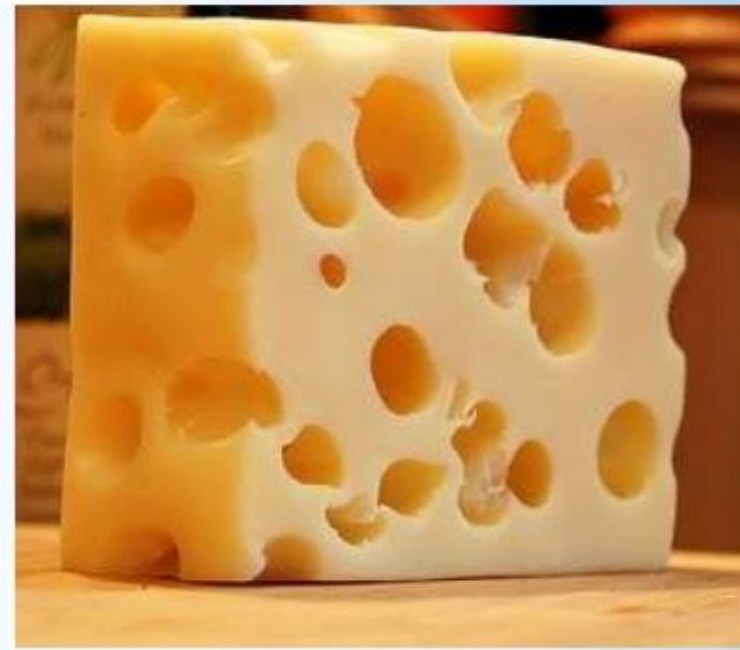
\*The dough, which is used for making bread, is fermented by using baker's yeast (*Saccharomyces cerevisiae*).



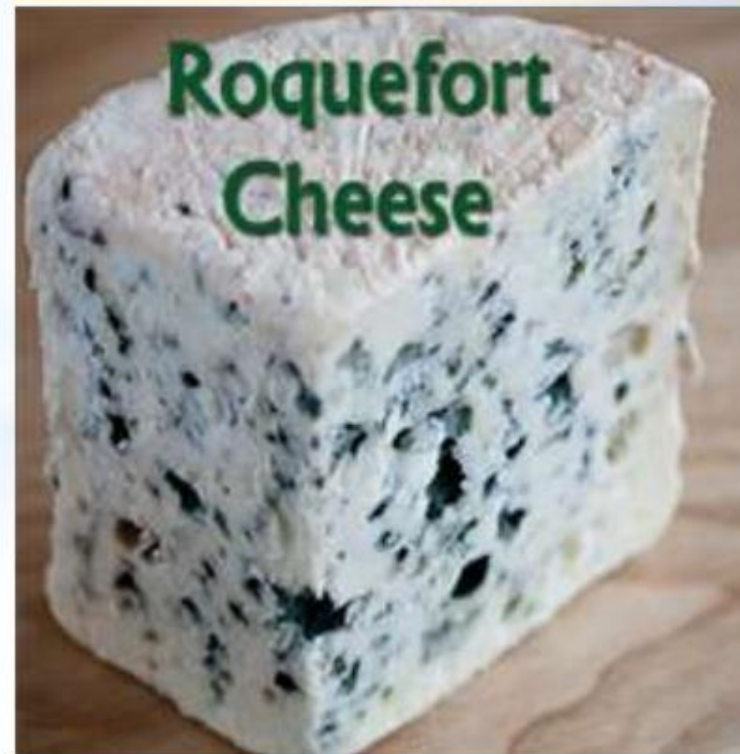
\*“Toddy”, a traditional drink of some parts of southern India is made by fermenting sap from palms.



\*The large holes in 'Swiss cheese' are due to production of a large amount of CO<sub>2</sub> by a bacterium named *Propionibacterium sharmanii*.



\*The 'Roquefort cheese' is ripened by growing a specific fungus on them for a particular flavour.





# \* Microbes in Industrial products:

- \* Production on an industrial scale requires growing microbes in very large vessels called Fermentors.

## a) Fermented Beverages

- \* *Saccharomyces cerevisiae* used for bread making and commonly called brewer's yeast, is used for fermenting malted cereals and fruit juices to produce ethanol.
- \* Wine and beer are produced without distillation whereas whisky, brandy and rum are produced by distillation of the fermented broth.





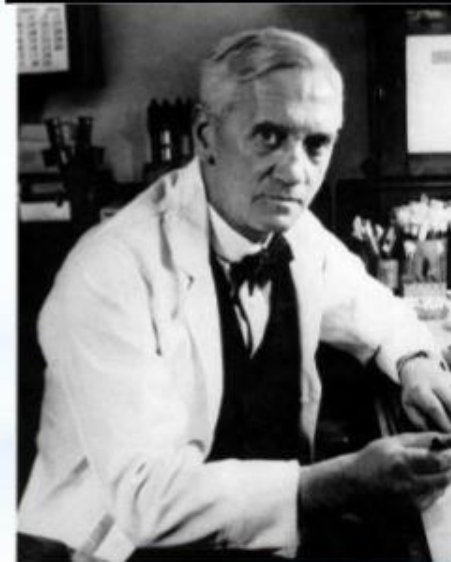
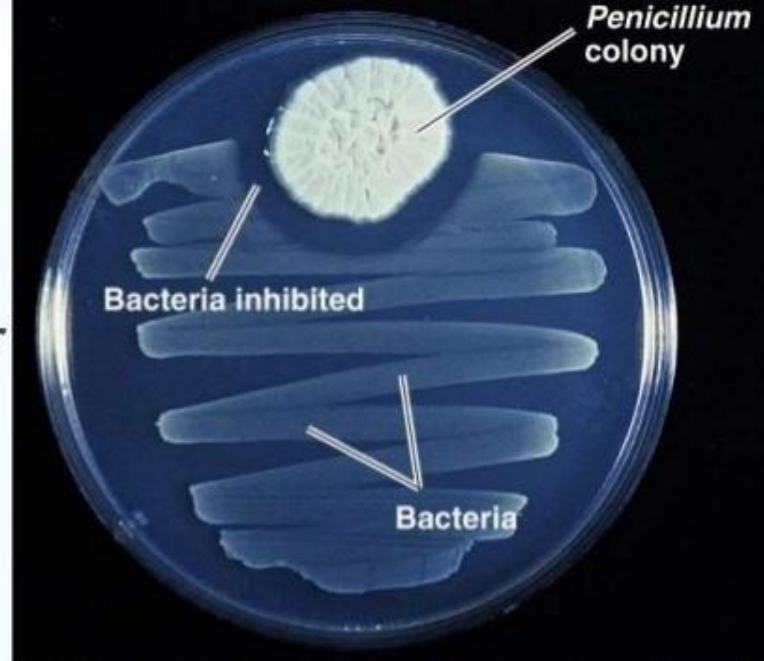
## \* *b) Antibiotics:*

\* Antibiotics are chemical substances, which are produced by some microbes and can kill or retard the growth of other disease causing microbes.

\* **Penicillin** was the first antibiotic to be discovered and it was a chance discovery.

\* Alexander Fleming while working on *Staphylococci* bacteria, once observed a mould growing in one of his unwashed culture plates around which *Staphylococci* could not grow. He found out that it was due to a chemical produced by the mould and he named it **Penicillin** after the mould *Penicillium notatum*. Its full potential as an effective antibiotic was

established by Ernest Chain & Howard Florey. Antibiotics help in treating plague, leprosy, whooping cough etc.



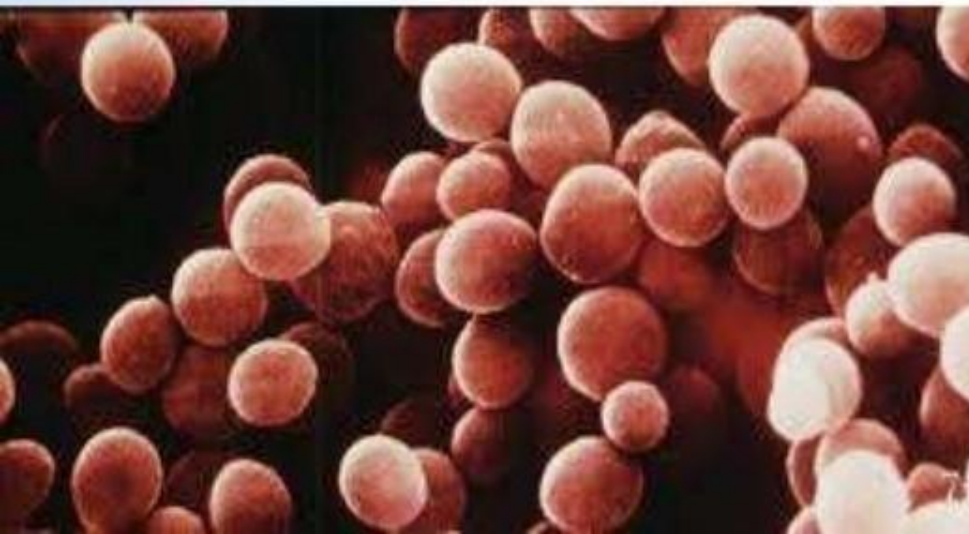
## \* ***c) Chemicals, Enzymes and other Bioactive Molecules***

- \* ***Aspergillus niger*** (fungus) – Citric acid
- \* ***Acetobacter aceti*** (bacterium) – Acetic acid
- \* ***Clostridium butylicum*** (bacterium) – Butyric acid
- \* ***Lactobacillus*** (bacterium) – Lactic acid
- \* ***Saccharomyces cerevisiae*** – Ethanol



# \* Enzymes

- \* Lipase - used in laundry detergents  
(removes oily stain from laundry)
- \* Pectinase and protease - used in  
Clarifying bottled juices
- \* Streptokinase (*Streptococcus*  
*bacterium*) - used as clot buster (to  
remove clots from blood vessels)



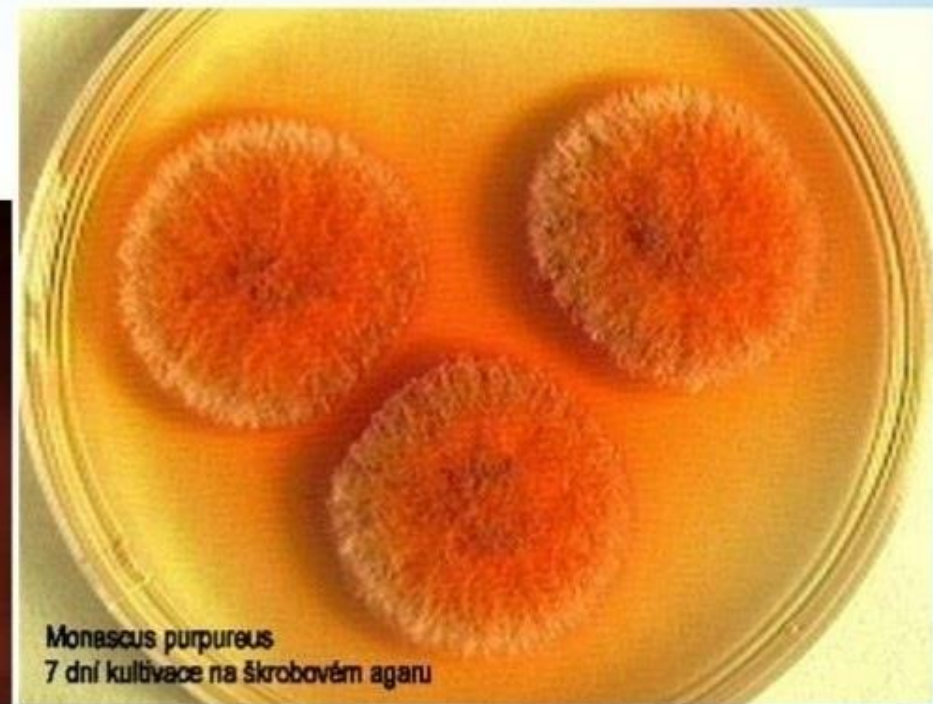


# \* Bioactive molecules:

\* **Cyclosporin A** (*Trichoderma polysporum* fungi) - used as immunosuppressive agent (for organ transplant patients).

\* **Statins** (*Monascus purpureus* yeast) - used as blood cholesterol lowering agents.

(Inhibits enzymes responsible for cholesterol synthesis )



Monascus purpureus  
7 dní kultivace na škrobovém agaru





# Assignment

**Dear Students,**

*The above content is a part of the chapter – **MICROBES IN HUMAN WELFARE.***

*Learn the concepts thoroughly and answer the questions.*

- 1) When Lactic acid bacteria is added to warm milk, it coagulates. Mention two other applications of LAB
- 2) Name the microbes used for statin production. How does statin lower blood cholesterol level ?
- 3) What role does yeast play in the making of Wine & Beer ?
- 4) Briefly discuss the discovery of antibiotics.
- 5) Why are bottled juices bought from market clearer than home made ones?
- 6) Swiss cheese has larger holes giving it a characteristic texture – give reason.
- 7) Identify a,b,c,d,e & f

Organism	Bioactive Molecules	Use
Monascus purpureus	(a)	(b)
(c)	(d)	Antibiotic
(e)	Cyclosporin A	(f)