9. Microorganisms in Indoor Microclimate

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Microbial Microclimate

- **Microbial microclimate** is made up of microorganisms - bacteria, viruses and molds occurring in the interior of buildings. A serious problem is especially spores, fungi and pollen particles, which can trigger allergic reactions.

- **Bacteria** are microscopic single-celled microorganisms of various sizes. The average bacterial size is about 0.3 - 2.0 µm. Some aquatic bacteria have a size of several tens to hundreds of micrometers.

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Microbial Microclimate

- **Viruses** are non-cellular microorganisms of genomic nucleic acid encapsulated by a protein coat, which can only reproduce inside a host cell.
- **Mites** are a number of small arthropods from the class of arachnids whose bodies have merged into a single whole. Many mites are parasitic and dangerous carriers of disease.
- **Fungi** (mold, fibrous microscopic fungi, micromycetes) are multicellular microorganisms. Molds grow in the form of multicellular thread-like structures called hyphae. Fungi that exist as single cells are called yeasts.

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Microbial Microclimate

- **According to the method of entry into the interior** are three sources of microorganisms:
  - Outdoor air as a source of microorganisms
  - Air-conditioning equipment of buildings as a source of micro-organisms
  - Human as a source of microorganisms

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Microbial Microclimate

- The highest incidence of microorganisms in the indoor environment is in the winter.
- Most microorganisms for their life and reproduction urgently needs **high humidity and temperature.**
- Building and technical objects are not the optimal environment for microbes, yet many families of microbes appear.
- These microbes need an extraordinary environment for their lives. They are among the so-called **extrémophiles.**

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Microbial Microclimate

- Selected species of extremophile organisms, including their environmental occurrence:
- **Thermophiles -** High temperatures
- **Psychophiles** - Low temperature
- **Adidophils** - Acidic environment (low pH)
- **Alkalophores** - Essential environment (high pH)
- **Halophyll** - High salt concentration
- **Barophiles** - High pressure
- **Oligophils** - Low concentration of organic substrate
- **Osmophiles** - Water unavailability

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Optimization of Microbial Microclimate

- The quality of the **microbial microclimate** is evaluated according to the acceptable concentration of microbes - for residential environments is max. 200 to 500 microbes/m^3, in the urban environment there are concentrations of up to 1500 microbes/m^3.

- Environmental quality requirements for conventional buildings are met, if bacterial or mold concentration do not exceed of 500 KTJ/m^3 of air (colony forming units).

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