



MICROBIOLOGY OF AIR

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- Transmission of airborne microorganisms.
- Physical environment stress.
- Bacterial species.
- Fungal species.
- Airborne diseases.
- Control of microorganisms in air.



AERO-MICROBIOLOGY

“Study of living microbes suspended
in air”

Transmission of airborne microorganisms.

- Organisms are sprayed by:
 - Coughing
 - Sneezing e.t.c
- Air microorganisms are carried by:
 - Dust particles
 - Droplet nuclei

Physical environment stress

- Dessication
- Humidity
- Temperature
- Radiation
- **Indoor air**

Example: *Tubercle bacilli*

Outdoor Air

- Algae
- Protozoa
- Yeasts
- Molds
 - Mold spore are predominant,
e.g *clasdosporium*
 - Bacterial species are,
Spore forming, Non spore forming

Bacterial species

- Micrococcus
- Sarcina
- Gram negative rods
- Gram positive rods
- Aerobic spore forming bacteria

Fungal species

- Clasdosporium
- Alternaria
- Pullularia
- Penicillium
- Batrytis
- Stemphylium



Airborne bacterial diseases

Diphtheria

- Acute contagious disease caused by *Corynebacterium diphtheriae*
- Formation of fibrous pseudomembrane on respiratory mucosa, myocardial and neural tissue damage.
- Symptoms:
 - Sore throat
 - Low fever
 - Cutaneous lesions e.t.c.



Tuberculosis

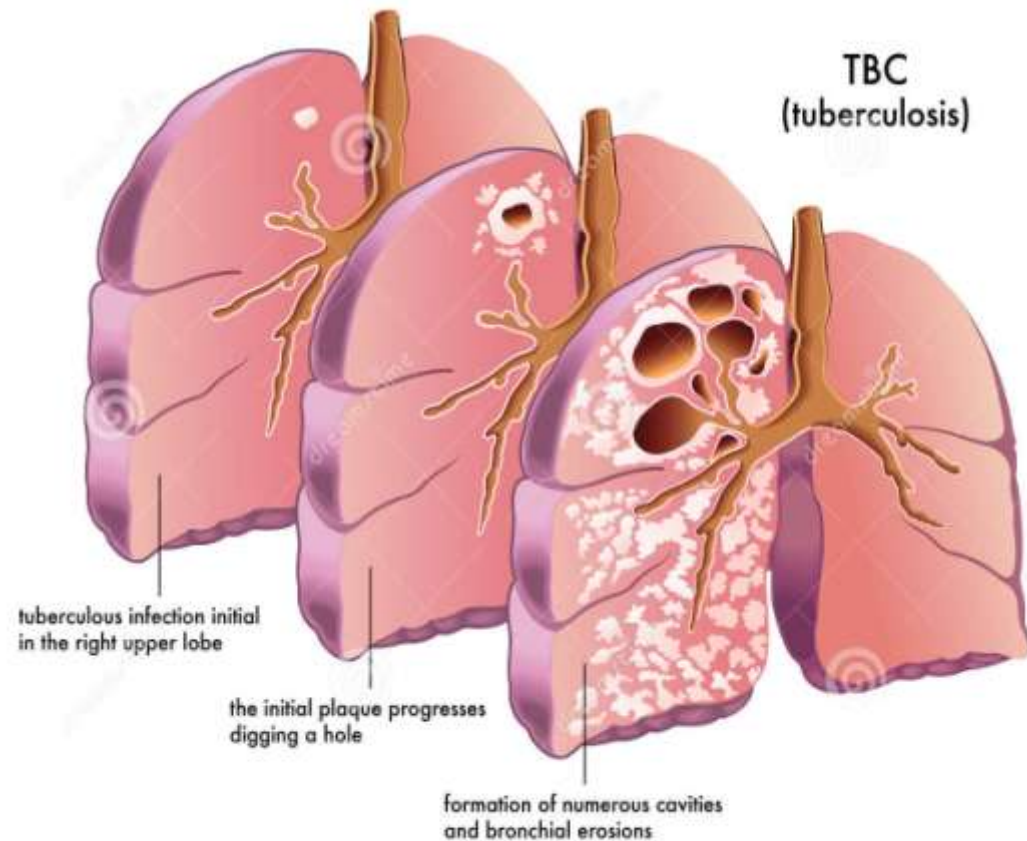
- Caused by *Mycobacterium tuberculosis*,
- Initiated by inhalation
- **Symptoms:**

Chronic cough

Blood tinged sputum

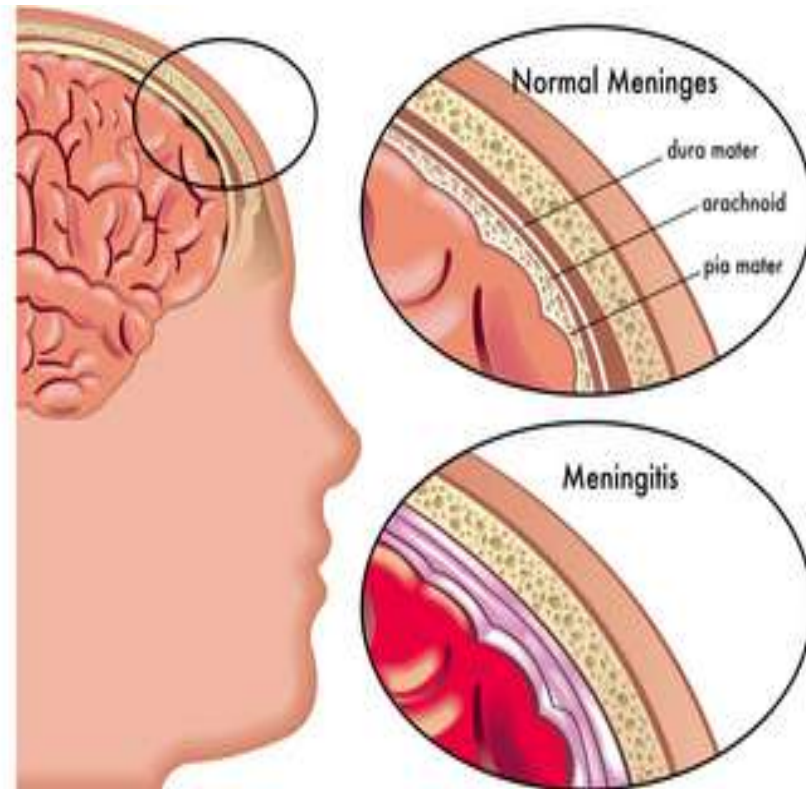
Night sweats

Weight loss e.t.c.



Meningitis

- Caused by *Neisseria meningitidis*
- Inflammation or infection of meninges.
- **Symptoms:**
- Headache
- Neck stiffness
- Fever
- Confusions
- Photophobia
- Phonophobia





Airborne Viral Diseases

Small pox

- Caused by *poxviridae* family:
Variola major
Variola minor
- Localized in small blood vessels of skin and mouth.
- Rash and fluid filled blisters.



Measles

- Contagious disease characterized by:
- Fever, Cough, Conjunctivitis eruption of buccal cavity or labial mucosa, cutaneous rash e.t.c
- Caused by *paramyxovirus* , spread largely from droplets by nose, throat, mouth of person.



Influenza

- Acute respiratory disease characterized by fever, cough, headache, inflamed respiratory membranes caused by *myxovirus*.

Symptoms of INFLUENZA

FEVER



ACHES



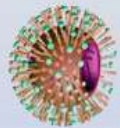
CHILLS



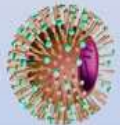
TIREDCNESS



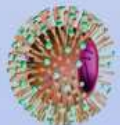
SUDDEN ONSET



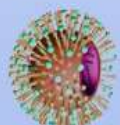
Central
- Headache



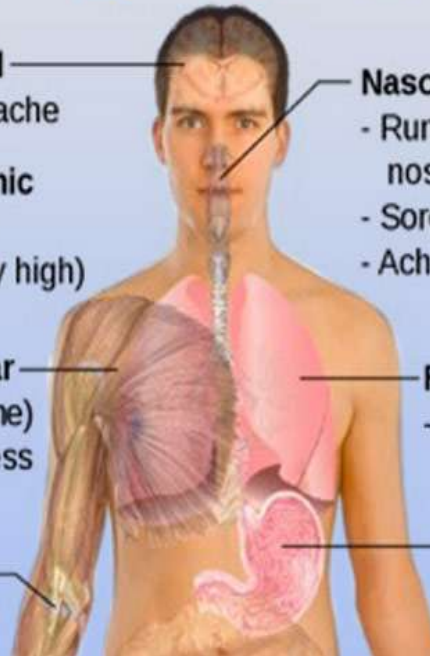
Systemic
- Fever
(usually high)



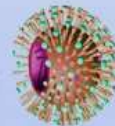
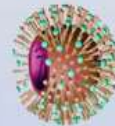
Muscular
- (Extreme)
tiredness



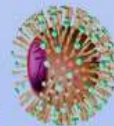
Joints
- Aches



Nasopharynx
- Runny or stuffy
nose
- Sore throat
- Aches



Respiratory
- Coughing



Gastric
- Vomiting





Airborne Fungal Diseases

Systemic Mycosis

- Fungal infection caused by inhalation of fungal spore,
- Mycosis initiate in skin.



- **Symptoms:**

- Fever, Chills, Night sweats, Weight loss, Depression People are at risk of fungal infections when they are taking strong antibiotics for a long period of time because antibiotics kill not only damaging bacteria, but healthy bacteria as well. This alters the balance of microorganisms in the mouth, vagina, intestines and other places in the body, and results in an overgrowth of fungus

Histoplasmosis

- Infectious disease caused by *Histoplasma capsulatum*.
- Also known as **DARLING'S DISEASE**.
- Primarily effects lungs.



Cryptococcosis

- Infectious disease caused by *Cryptococcus neoformans*. AIDS causing disease.
- It primarily effects:
 - Lungs
 - Meninges
 - Kidneys
 - Bone
 - Skin





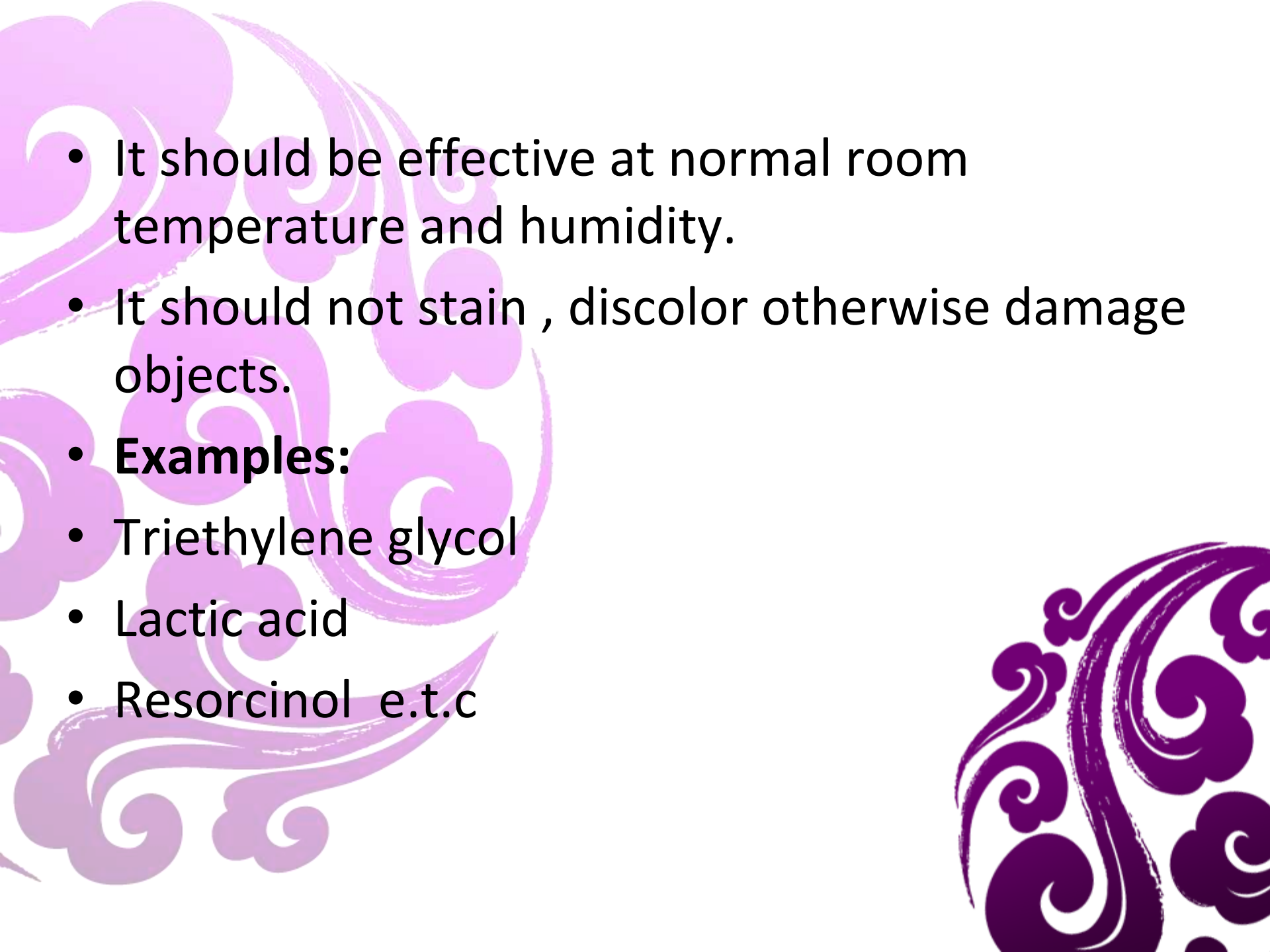
Control of microorganism in Air

Ultraviolet Radiation

- This method has great potential value for reducing the microbial flora of air.
- It is done by following ways :
 1. Direct irradiation.
 - e.g. aseptic filling rooms for pharmaceutical preparations
 2. Indirect Irradiation.
 - e.g. occupied rooms, offices, wards e.t.c.

Chemical Agents

- Chemical substances vaporized into air of room are effective in reducing the microbial flora.
- Chemicals are dispersed as aerosol and show its anti microbial action.
- **Characteristics of chemical agent as germicide:**
- It should be highly bactericidal.

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- It should be effective at normal room temperature and humidity.
 - It should not stain , discolor otherwise damage objects.
 - **Examples:**
 - Triethylene glycol
 - Lactic acid
 - Resorcinol e.t.c

Filtration

- Use of cotton plug
- Air filters



LAMINAR AIR FLOW SYSTEMS

- Air passes through **HIGHER EFFICACY PARTICULATE AIR (HEPA)** filters.
- Operation.
- Application.
- Natural or mechanical ventilation of rooms.



REFERENCES

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2. Lippincott, William and Wilkin. USA.2001.
3. Collin and Lynes, microbiological methods oxford, 1995
4. Pelczar, Microbiology, McGraw-Hill inc, 1996

The background features a dark purple gradient with intricate, stylized floral and scrollwork patterns in shades of light purple and blue. The patterns are dense and ornate, typical of traditional decorative art.

THANK YOU