

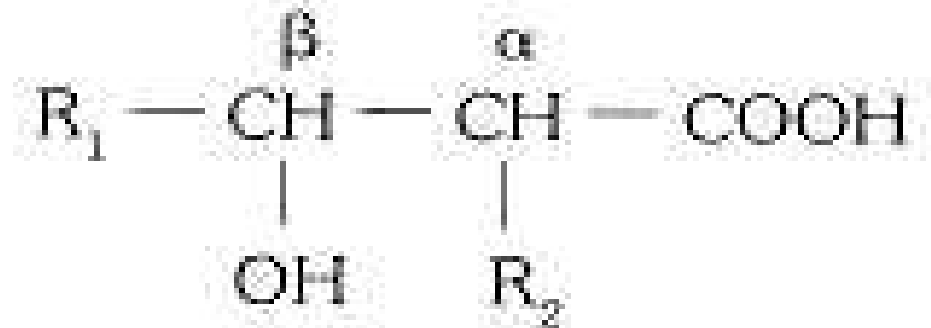
The Mycobacteria

(the Fungus-bacterium)

Tuberculosis and Leprosy

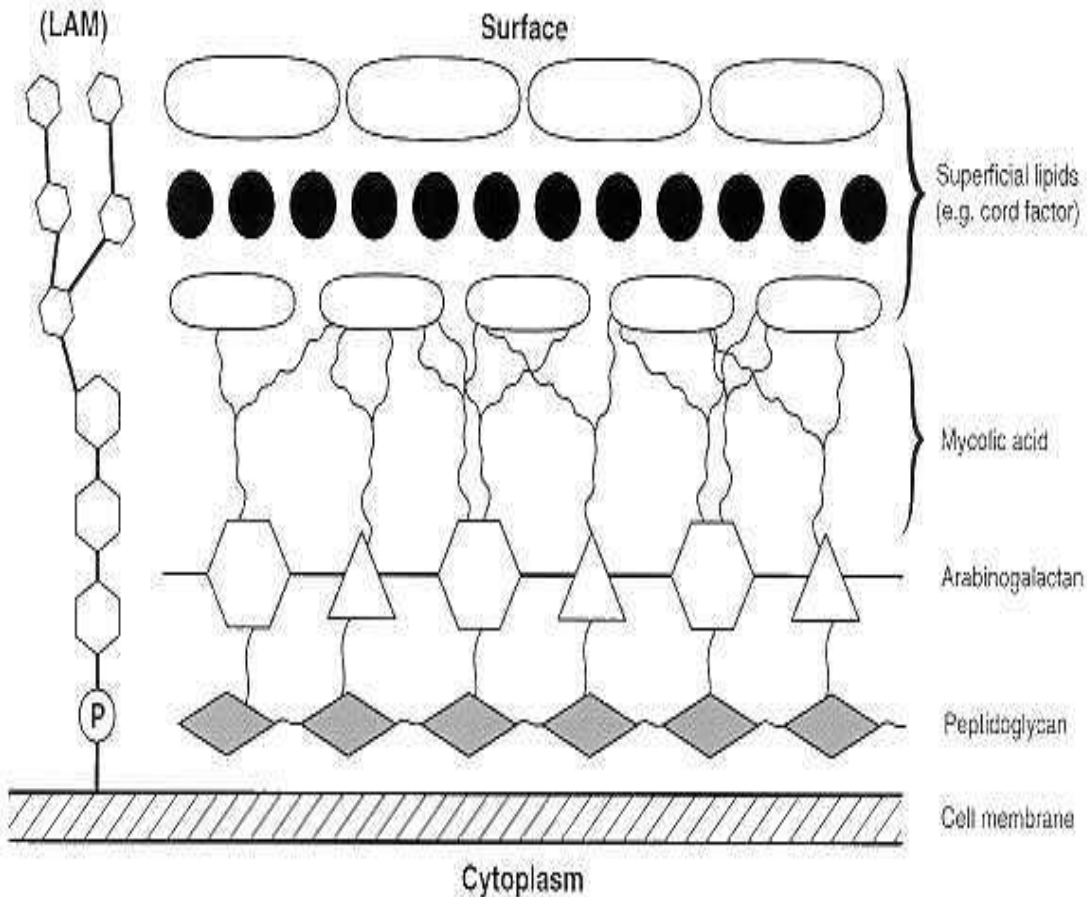
M. tuberculosis and *M. lepre*

Structure 1



- Mycobacteriaceae → **Mycobacterium** & Nocardia
- Genus is characterized by the presence of long-chained fatty acids → Mycolic acids
- R_1 and R_2 vary from C_{60} to C_{90} in *Mycobacterium*;

Structure 2



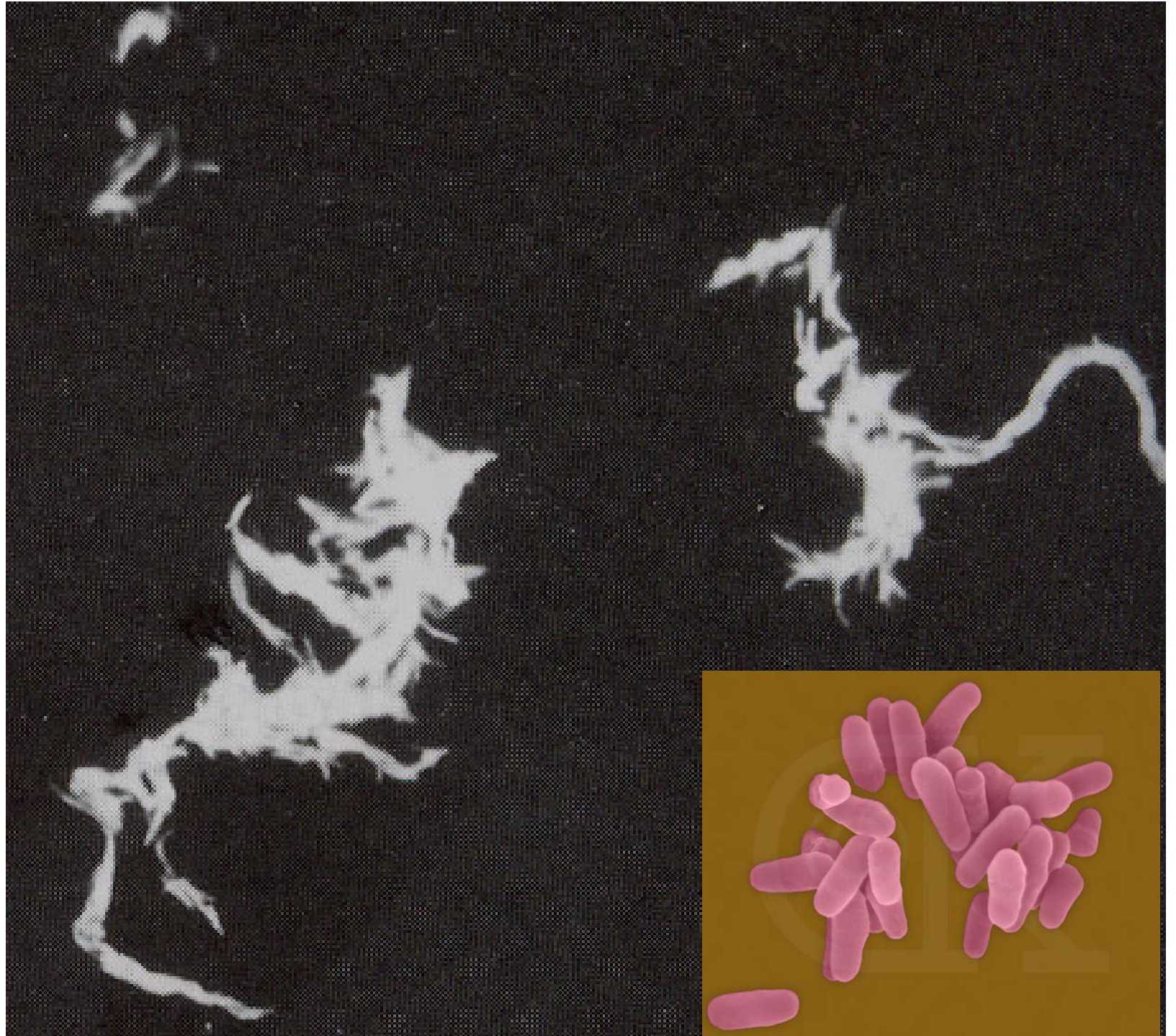
- slender, curved rods
- Hydrophobic
- Acid fast
- The cell wall is composed
 - mycolic acids,
 - complex waxes,
 - unique glycolipids.

The Mycobacteria

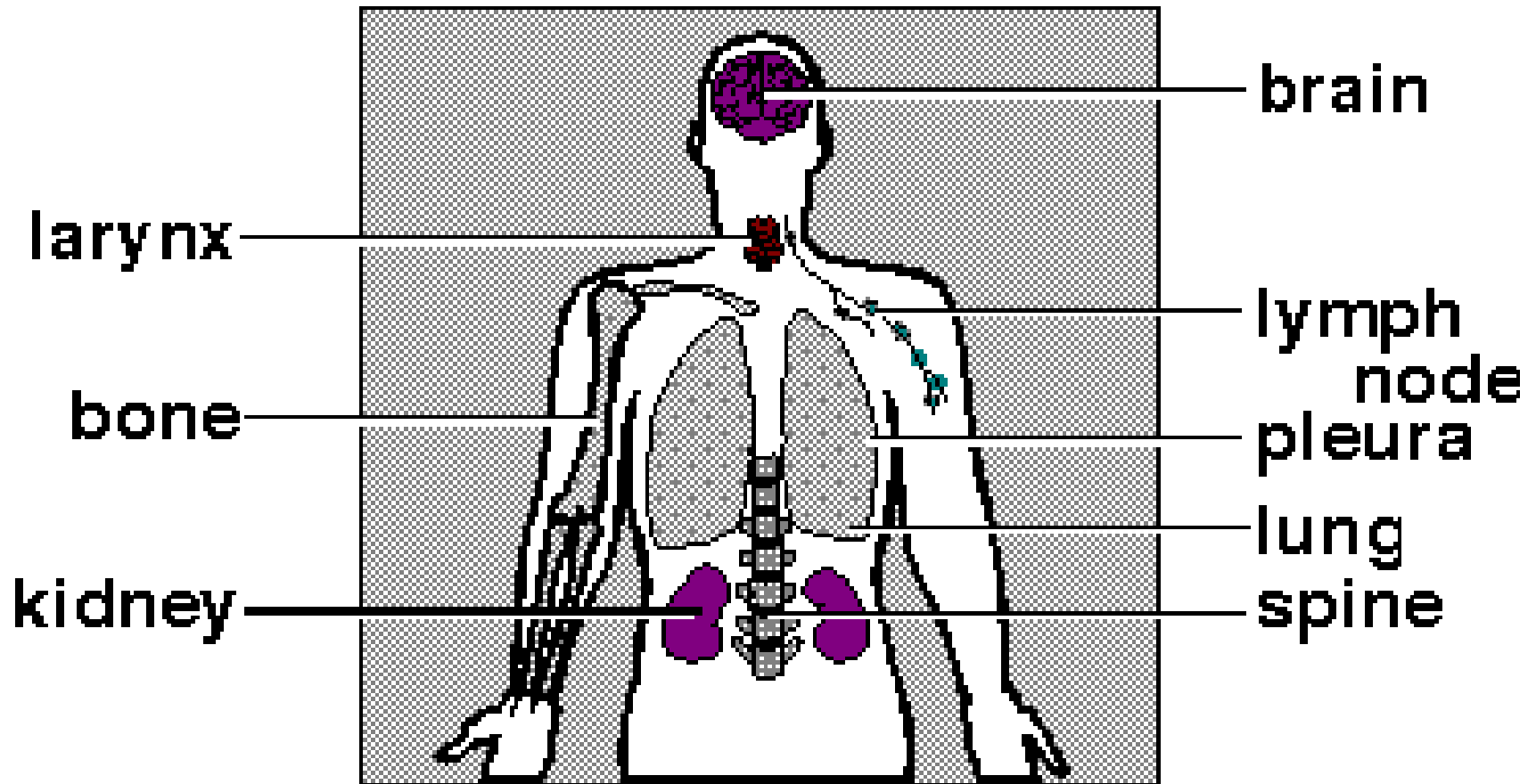
- three main groups.
 - non-pathogenic mycobacteria,
 - **obligate pathogenic mycobacteria**
 - potential pathogenic mycobacteria

Physical Characteristics

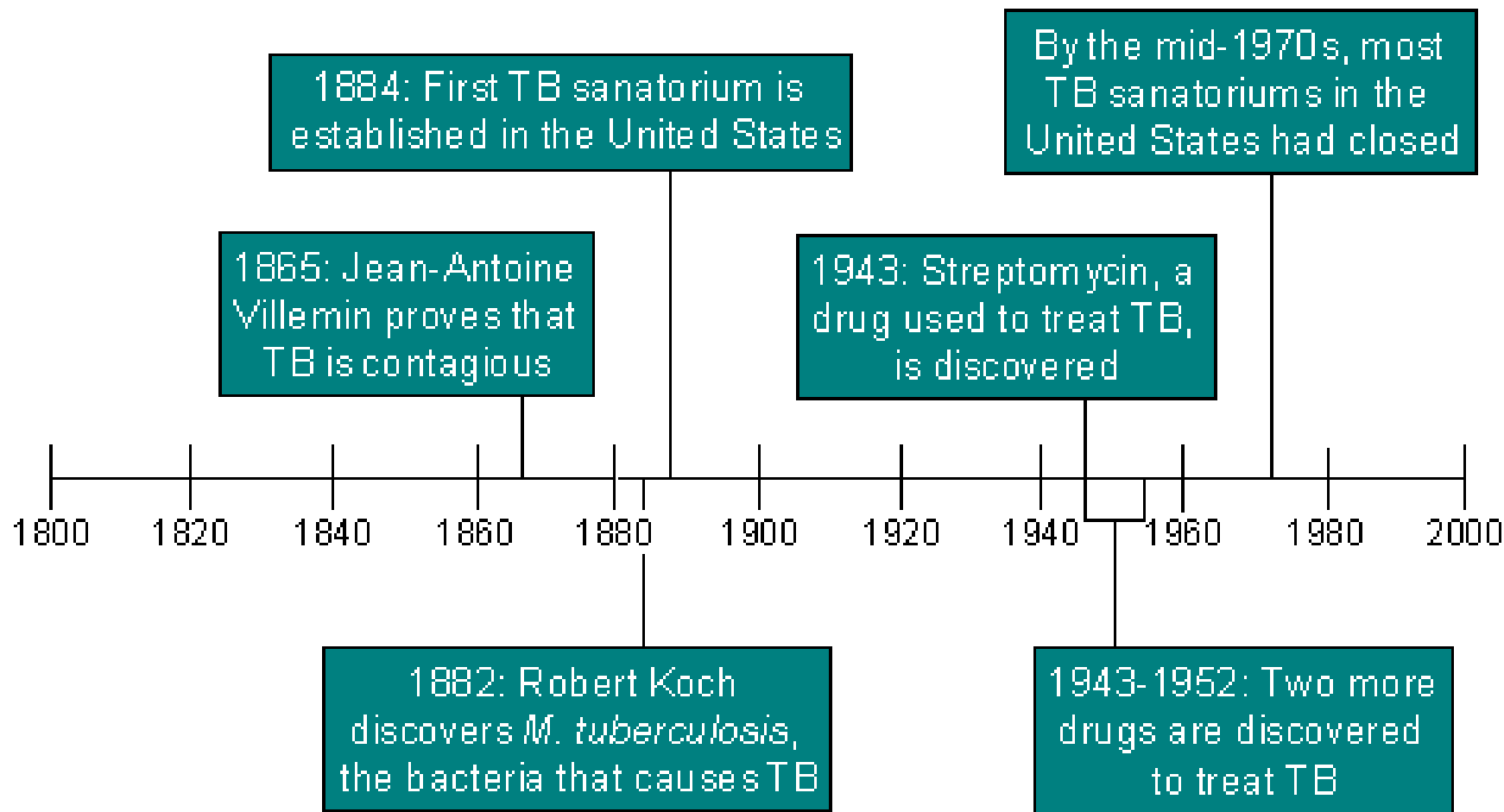
- Highly resistant to trauma and environment
- Gram stain does not work
- Ziehl-Neelsen does
- Slow growth (doubling time (18-24h))



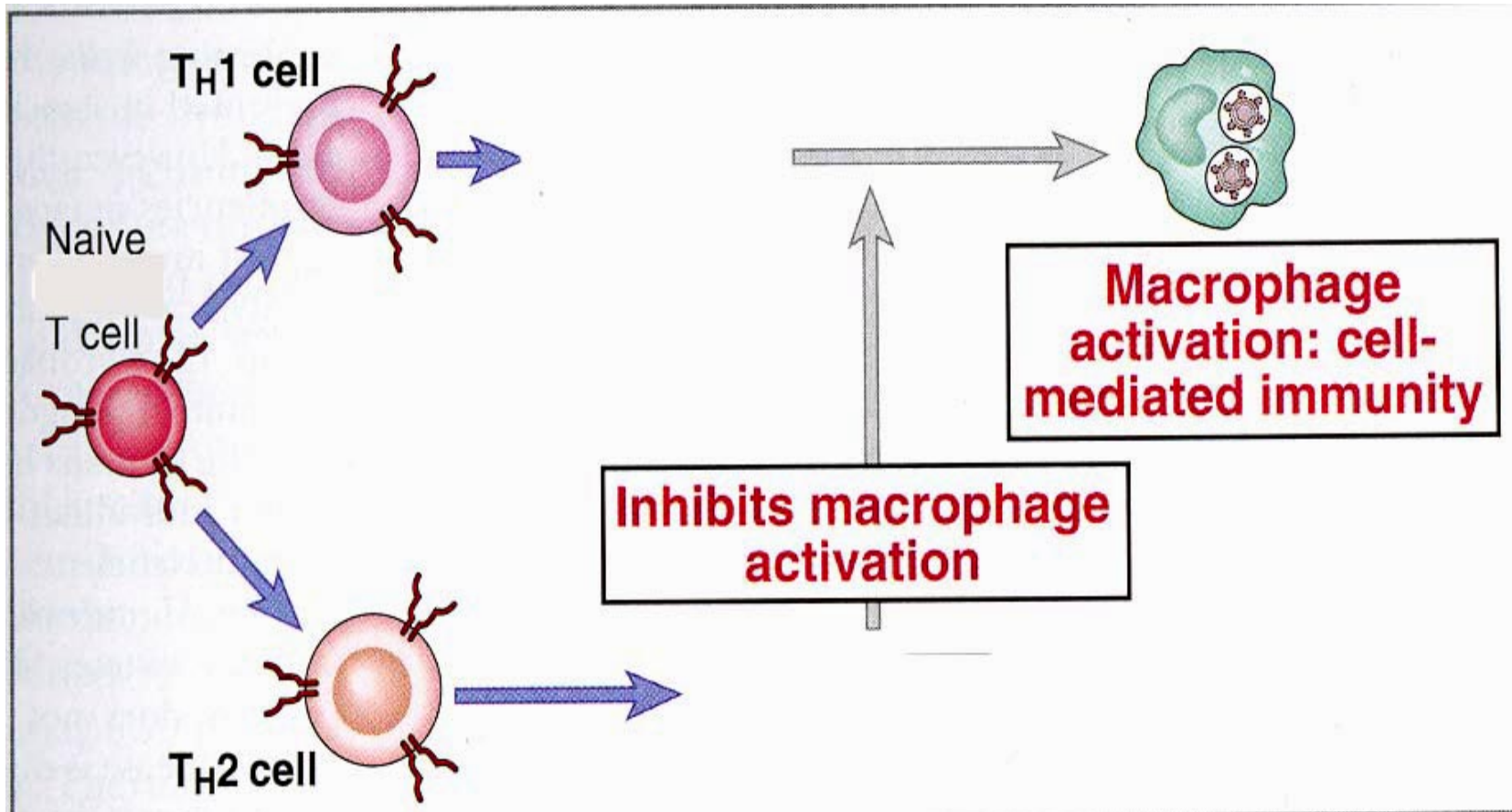
TB disease in different places in the body



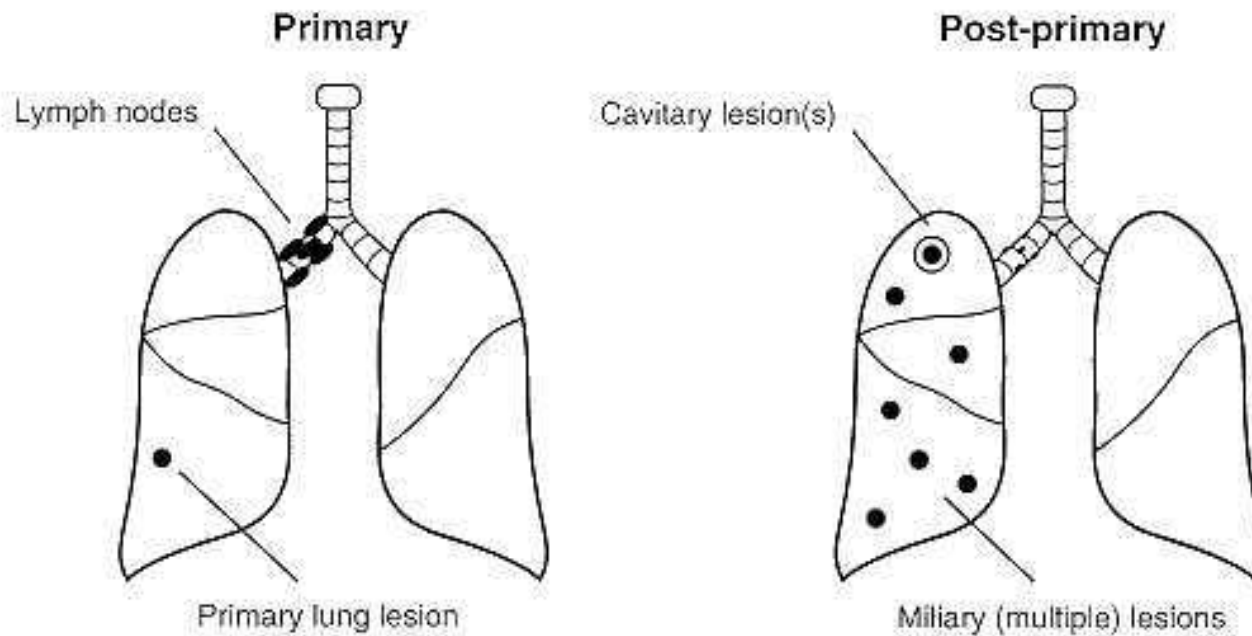
Genus: Mycobacteria

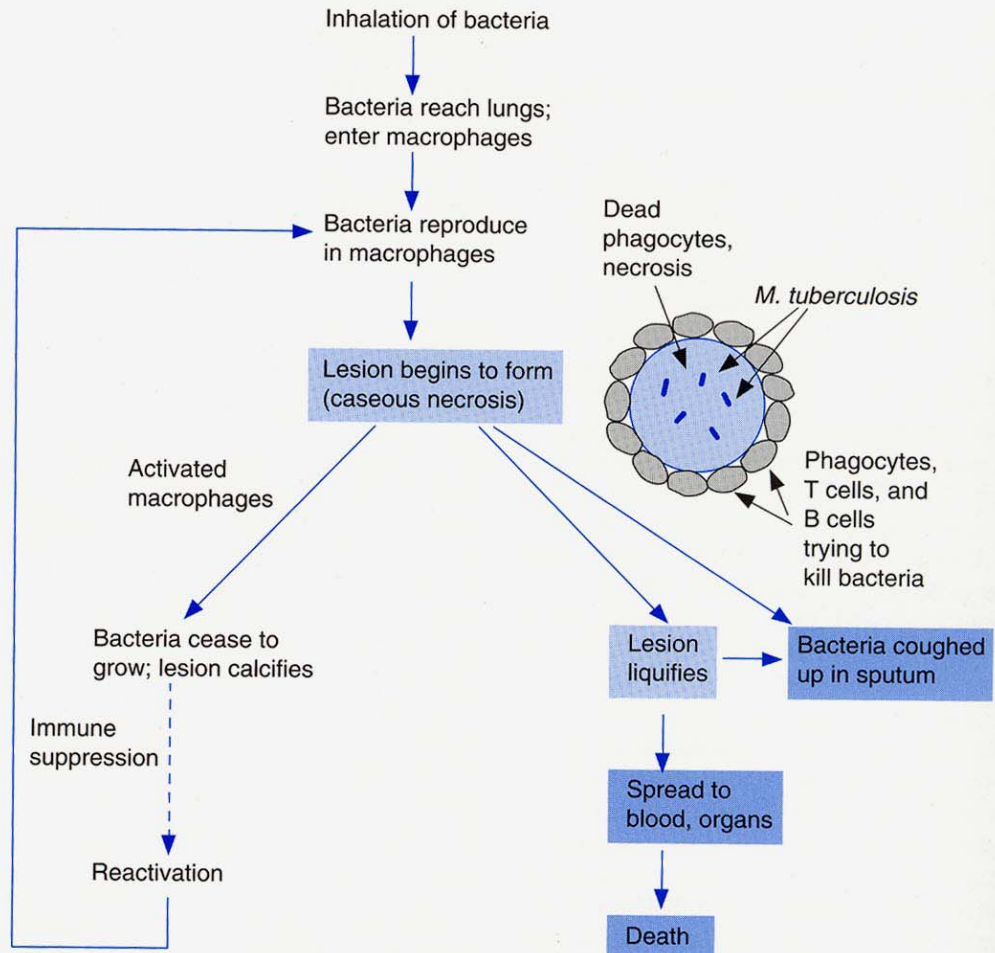


Pathogenesis



Pathogenesis





Steps in the pathogenesis of TB.

Primary TB

Localized Infection

1. Entry
3. Exit

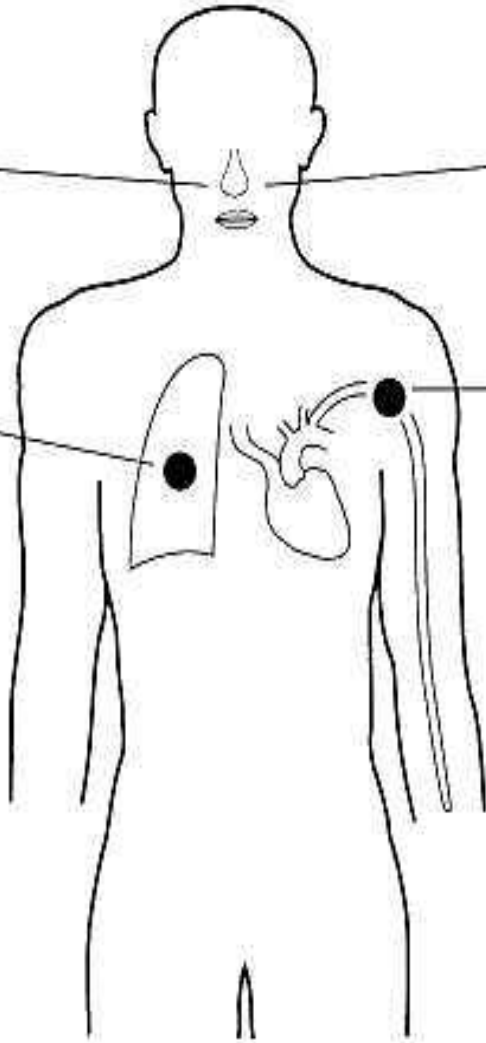
2. Disease
Pneumonia
Granulomatous
lesions

Systemic Infection

1. Entry
4. Exit

2. Spread
(lymphatic &
hematogenous)

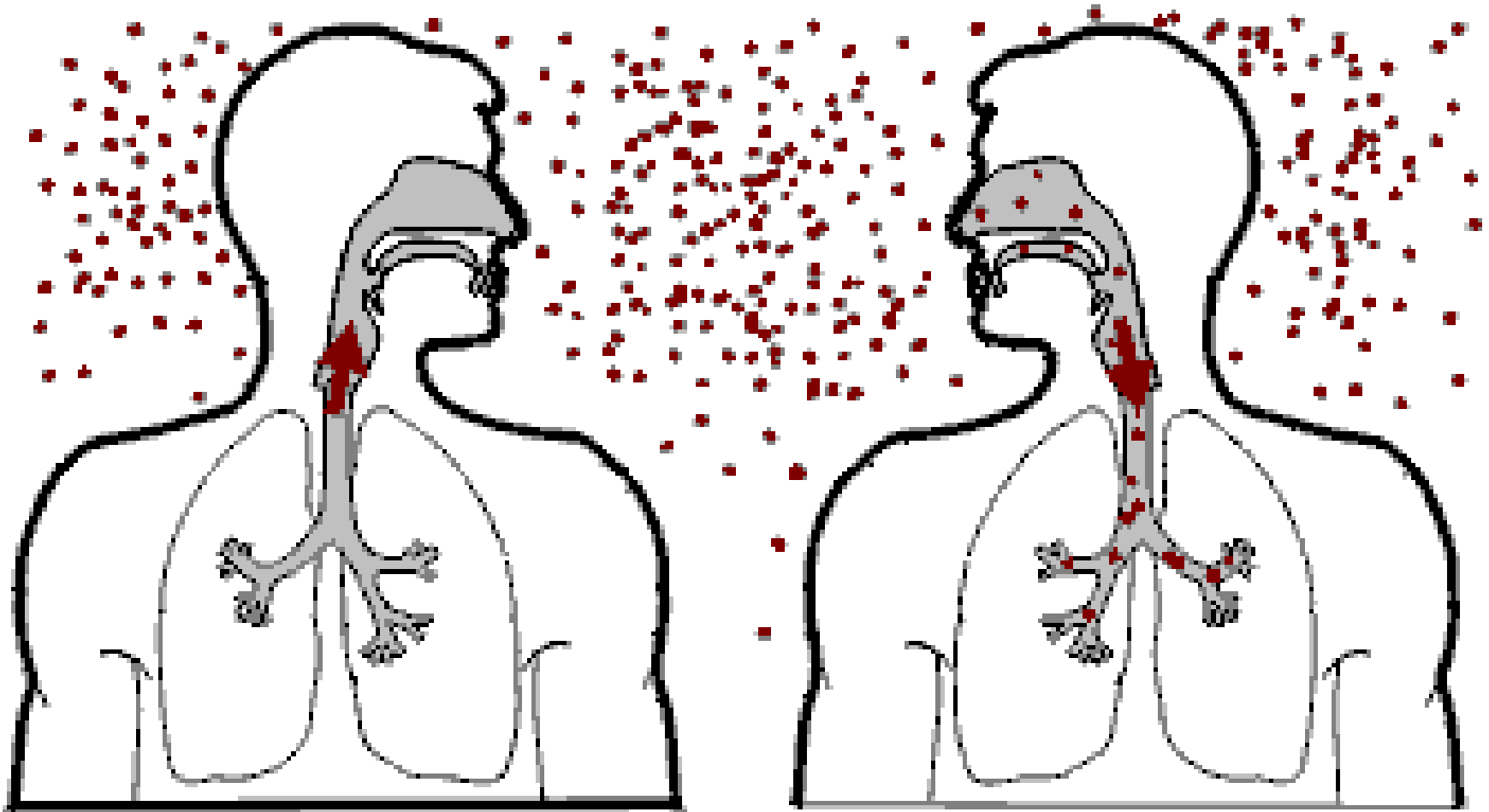
3. Disease
Granulomas
at any site



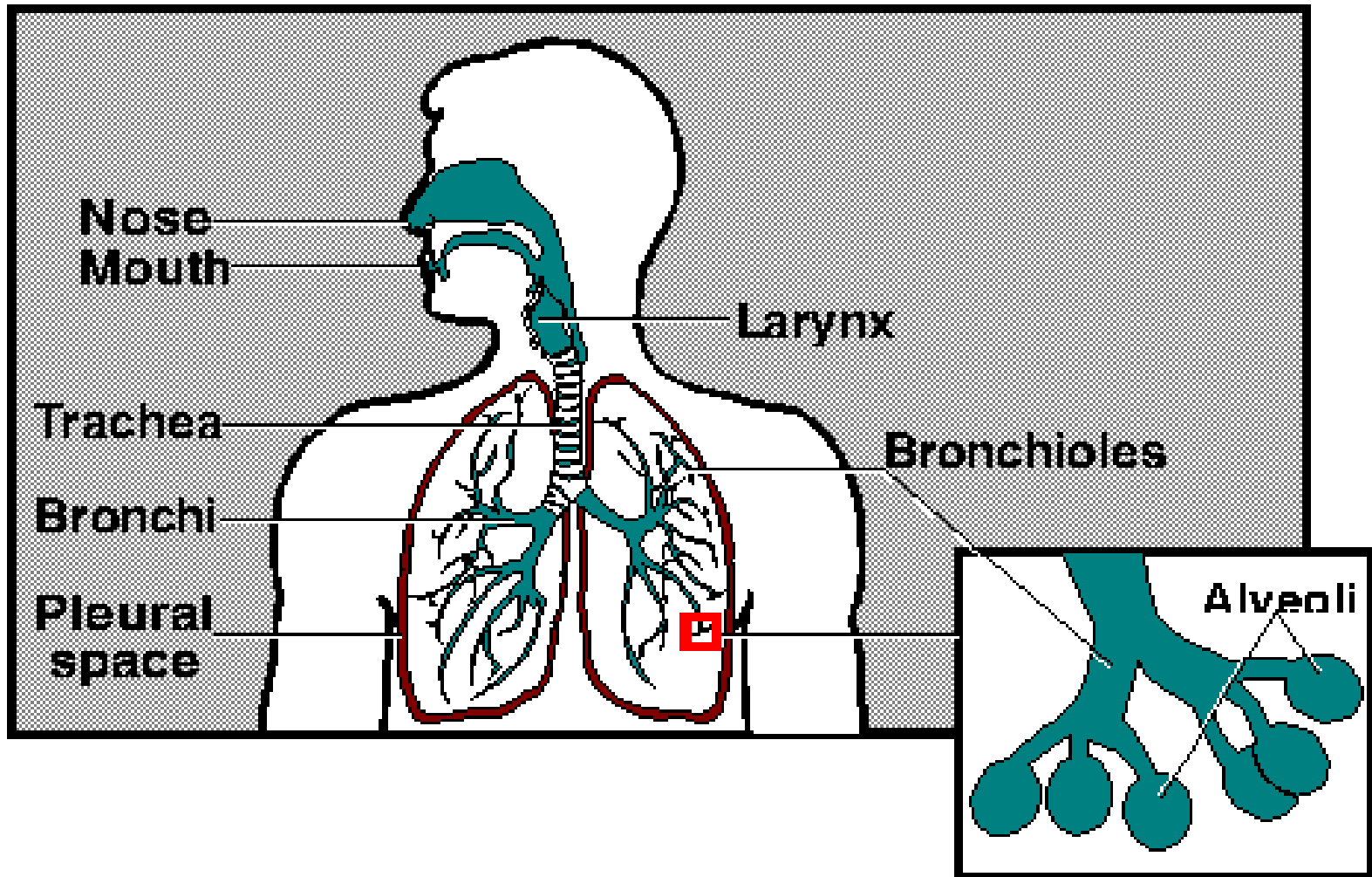
Post Primary TB

- Endogenous reactivation or exogenous reinfection
- Lesions
- Open / infectious case

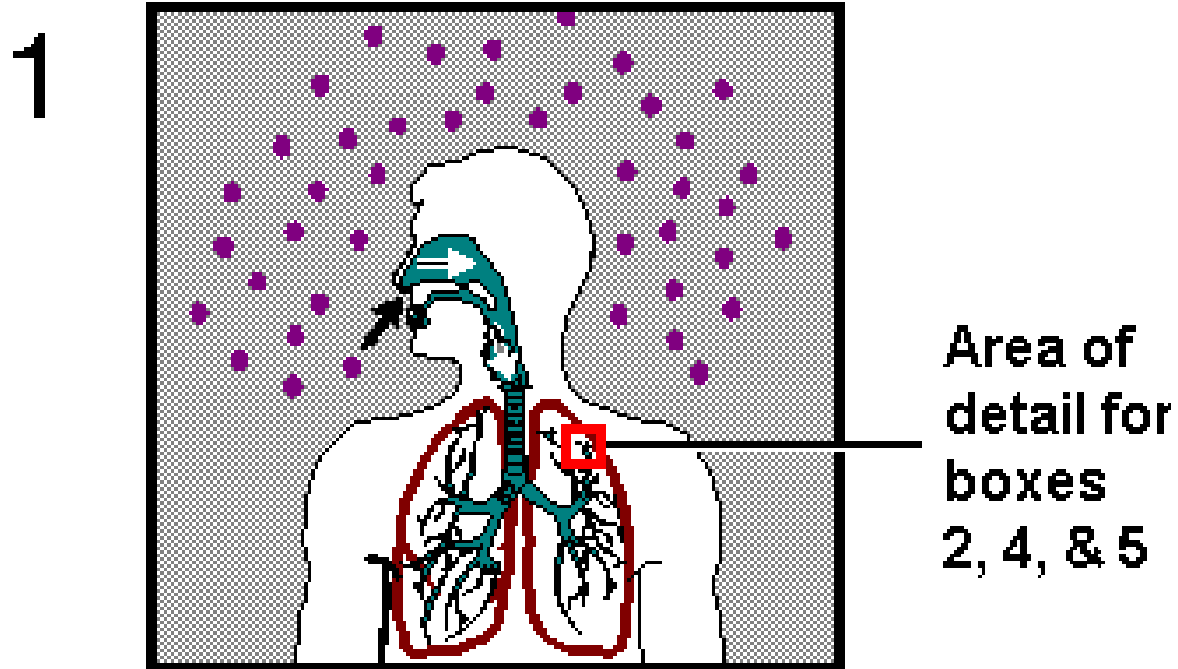
Transmission of TB



Genus: Mycobacteria

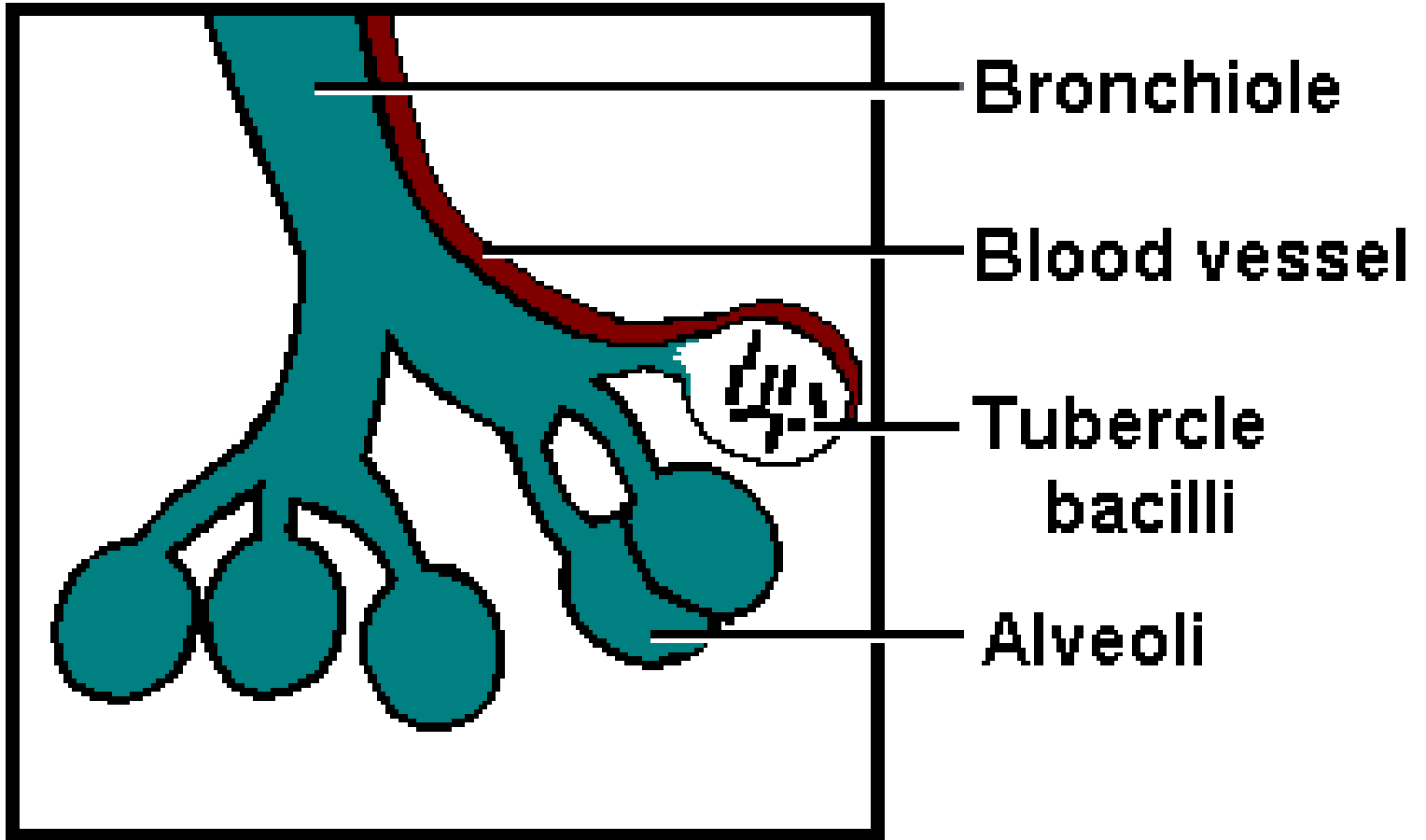


Pathogenesis of TB infection and disease.

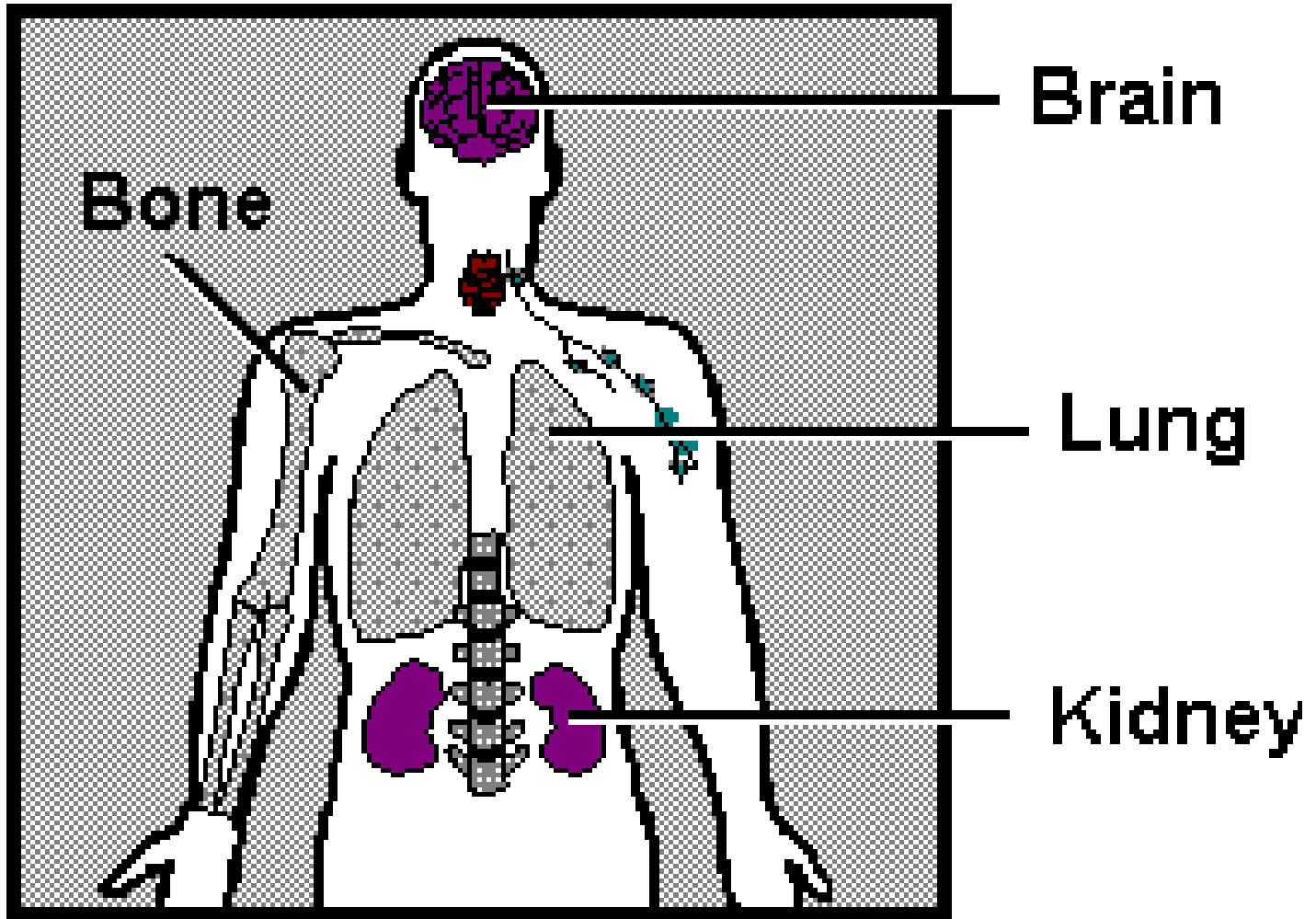


Droplet nuclei containing tubercle bacilli are inhaled, enter the lungs, and travel to the alveoli.

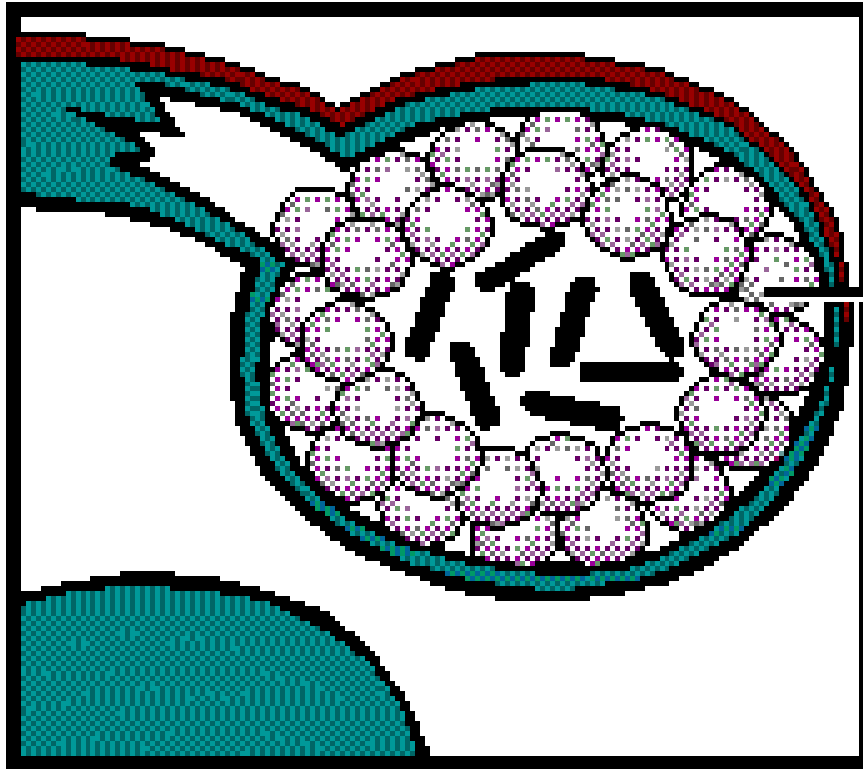
2



3

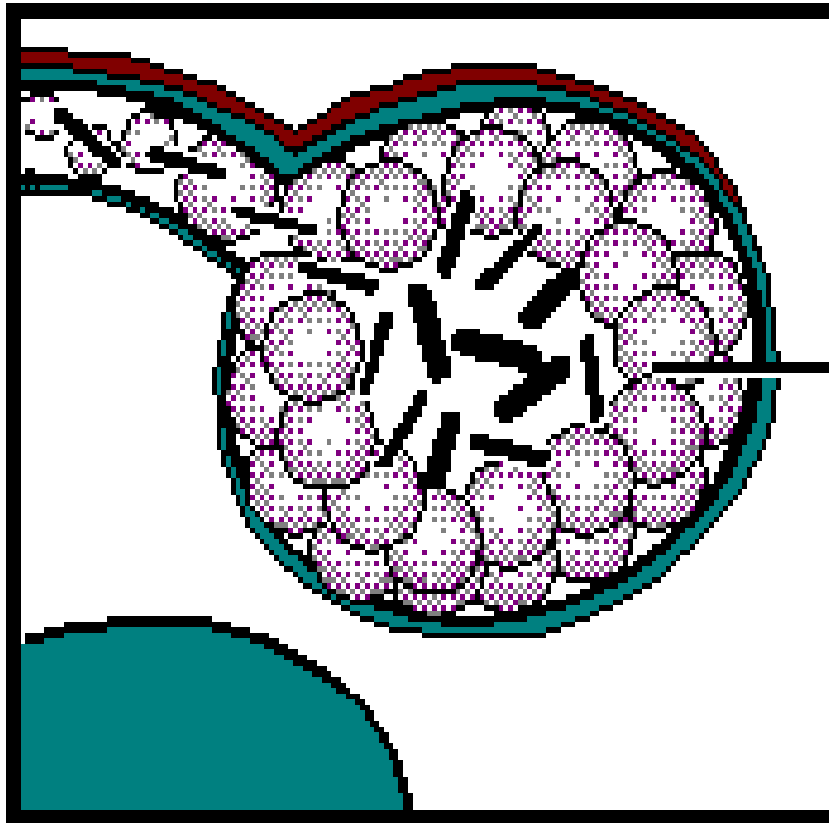


4



Special immune cells form a hard shell (in this example, bacilli are in the lungs)

5



Hard shell
breaks down
and tubercle
bacilli escape
and multiply (in
this example,
TB disease
develops in the
lungs)

Progression of TB.

- **People who are exposed to TB may or may not develop TB infection.**
- **People with TB infection may or may not develop TB disease.**
- **The risk of developing TB disease is highest in the first 2 years after infection.**

People Exposed to TB

NO TB INFECTION

Negative Skin
Test Reaction

NOT Infectious

TB INFECTION

Positive Skin
Test Reaction

NOT Infectious

During the first 2 years
after infection, people
with TB infection are at
high risk of developing
TB disease.

TB DISEASE

May Be
INFECTIOUS

After the first 2 years,
the risk is lower, but
people with TB infection
can develop TB disease
at any point in their
lives. Some medical
conditions increase the
risk for TB disease.

Remain
NO TB INFECTION

NOT Infectious

Remain
TB INFECTION
NO TB DISEASE

NOT Infectious

Other Mycobacteria

- *M. bovis* → tuberculosis in cattle
- *M. lepre* → leprosy

Leprosy

M. lepre

Leprosy

- Hansen's Disease
- *Mycobacterium leprae*.
- Leprosy has two common forms,
 - tuberculoid and lepromatous,
 - Both forms produce lesions on the skin,

Symptoms

- Hypopigmentation
 - Loss of sensation
 - Chronic skin lesions
 - Muscle weakness
- Lepromin skin test

Leprosy

- Several forms
- Prodromal symptoms generally slight
- Classification
 - Indeterminate
 - Tuberculoid
 - Borderline

Disease management

- chemotherapy to stop the infection;
- treatment to minimize potential physical deformities; and
- physical, social, and psychological rehabilitation.
- Close follow-up

Global leprosy situation 2000

