Bacillus spp.

- Species
- Morphology and Staining
- Cultural Characteristics
- Biochemical Tests
- Diseases
- Diagnosis

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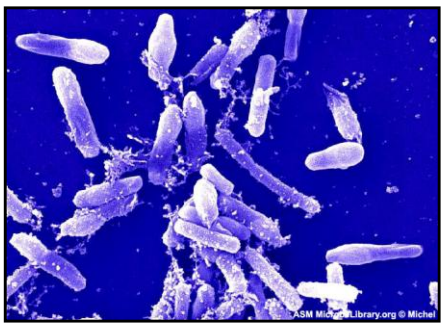
13.3.2025 1

Species

Bacillus anthracis

B. cereus



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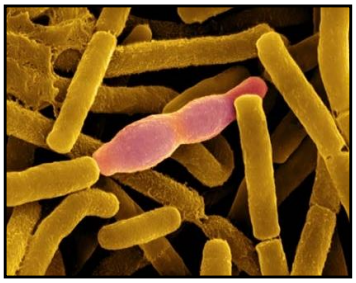
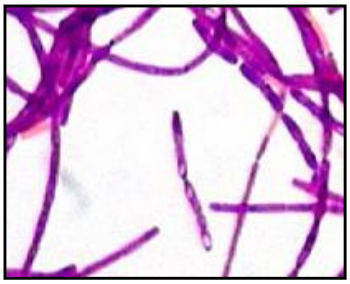
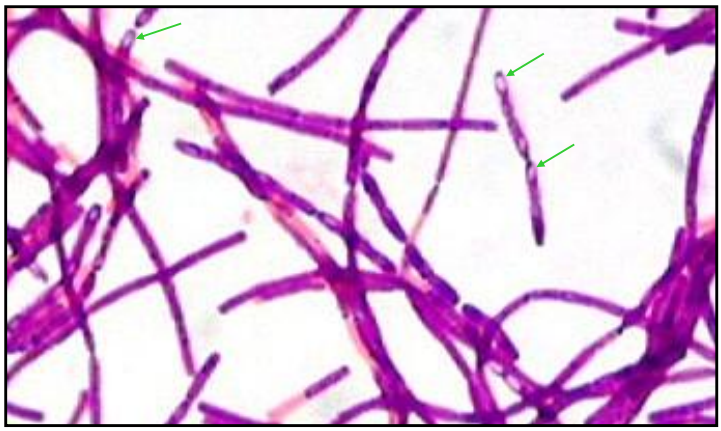
- Bacillus is a Gram-positive spore-forming bacteria.
- Bacillus is motile, non-capsule forming, *except Bacillus anthracis* (with capsules and non-motile).



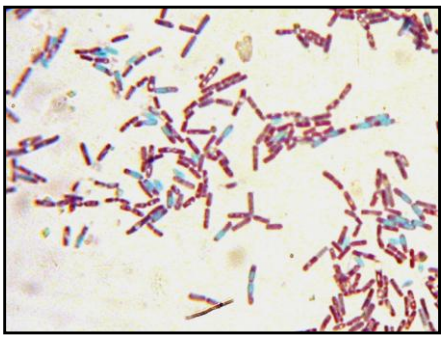


Bacillus with spores



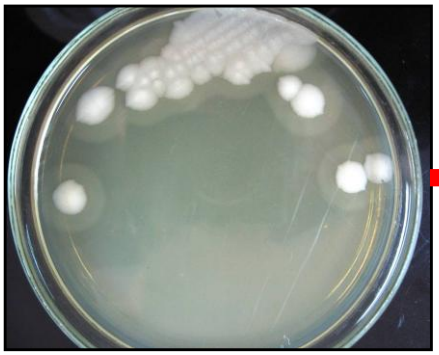
Spore Stain

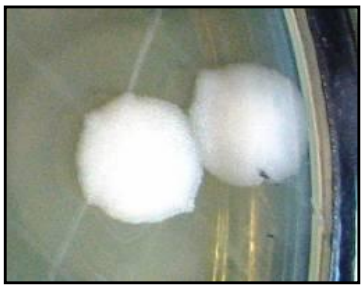
- prepare a smear of organism and allow it to air -dry .
- Immediately flood the smear with malachite green and allow to stand for 5 minutes.
- wash the smear with gentle stream of water.
- Stain with safranin for 45 seconds.
- Spores will be green and the vegetative cell will be red.



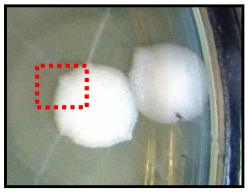
Cultural Characteristics

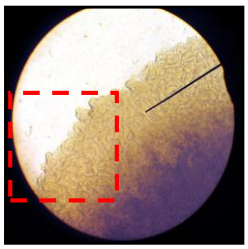
- Aerobic bacilli, most will grow on nutrient agar.
- The colonies are large, flat, dry and rough, it has a rhizoid-type colon after 24 h incubation period at 37 °C.

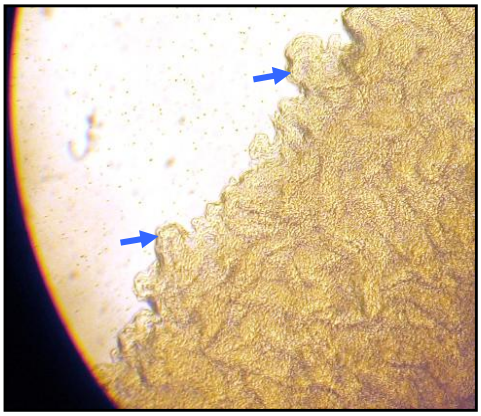


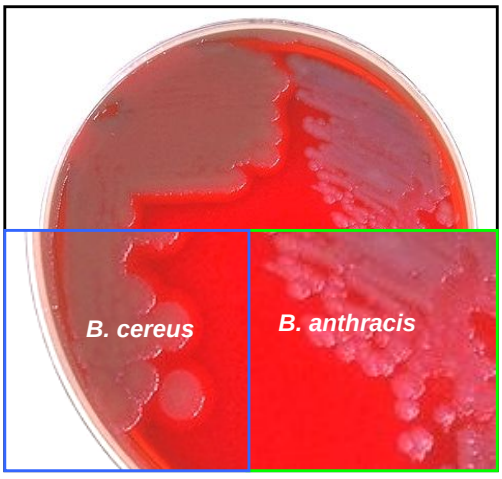


- Under low magnification, curved peripheral projections at the edge of the colonies give rise to a **(Medusa head)** appearance.









Growth on blood agar accompanied by haemolysis except in *bacillus anthracis* which is almost always non-haemolytic.

- Growth on blood agar with complete haemolysis

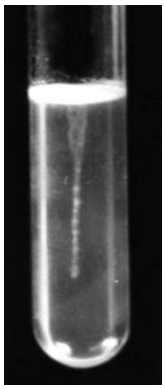
- Differences between ***B. anthracis*** and ***B. cereus***

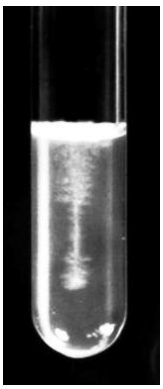
	B. anthracis	*B. cereus*
Motility	Non-motile	motile
Capsule	capsulated	Non-encapsulated
Hemolysis	Non-hemolytic	β-hemolytic
Resistance to Penicillin	S	R (produce β-lactamase)

Biochemical tests

Species	Motility	β haemolysis	Penicillin (10 – unit disc)	7% NaCl	Gelatin Stab culture
B. anthracis	-	-	Sensitive	+	Inverted fir tree
B. cereus	+	+	Resistant	-	Rapid Liquefaction

Growth on gelatin medium





Bacillus anthracis stab inoculated into nutrient Gelatin giving the characteristic inverted fir-tree type growth after 8 days at 25 °C.

Diseases

Bacillus anthracis **causes an important disease called Anthrax**

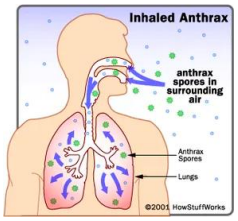
1- Cutaneous anthrax (Most common)

- Described as Malignant pustule. Lesion is common in the head neck and exposed arms.
- Occurs 2-3 days after entering of spores into surface skin cuts.

Skin form, malignant pustule

2- Pulmonary anthrax (Less common)

- Wool-sorter disease: Caused by inhalation of spores.
- Causes high mortality due to intense inflammation hemorrhage and septicemia.



3- Intestinal anthrax (Very rare)

- Consumption of contaminated meat.
- Common in Africa.
- Presents with vomiting diarrhea and fever occasionally dysentery.

Bacillus cereus causes food poisoning in human.

Diagnosis

1- Cutaneous anthrax

Specimens include fluid or pus from a local lesion.

2- Pulmonary anthrax

Specimens include blood, pleural fluid, and cerebrospinal fluid.

3- Intestinal anthrax

Specimens include stool or other intestinal contents.

- Examined Gram stained smears.
  Gram stain show chains of large Gram-positive rods.

A- Define Medusa head.

B- Mention the disease forms caused by *Bacillus anthracis*

Morphology and staining

Group A **Date: 20.3.2025**

A- Mention the morphology and staining of *Bacillus anthracis*

B- Mention 2 differences between *B. anthracis* and *B. cereus*