# *Clostridium* spp.

- Species
- Morphology and Staining
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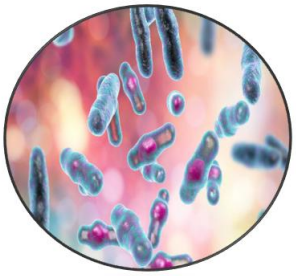
- Diagnosis



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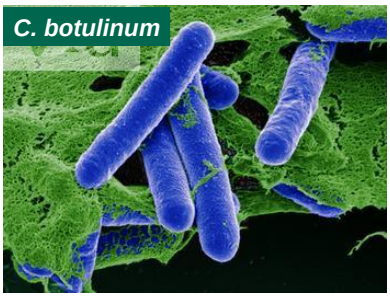
# Species

- ***Clostridium tetani***
  - tetanus
- ***C. perfringens***
  - Causes gas gangrene; food poisoning
- ***C. botulinum***
  - botulism
- ***C. difficile***
  - pseudomembranous colitis



## Morphology and staining

- **General characteristics of *Clostridium* spp.**

- Gram positive bacilli , spore former, motile except *C. perfringens*
- The location and shape of the spores is very important for the identification of this bacteria it may be in the middle, sub-terminal or terminal like in case of **tetanus the spores looks dram-stick like bacilli.**



### *Clostridium tetani*

- Causative agent of tetanus
- Found in soil, intestinal tracts, and feces of animals.
- Small rods, motile
- Spore-forming **(drumstick appearance)**
- Extremely sensitive to oxygen toxicity.

# Cultural Characteristics

## Culture media

- Nutrient agar
- Blood agar
- Cooked meat broth/medium
- Thioglycolate medium

Cooked meat broth/medium

Thioglycolate medium

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- This type of bacteria grows on culture media containing blood or glucose in optimal temperatures 37 to 47 ° C.
- The macroscopic appearance of colonies is large, concave, rounded, shiny, and opaque with regular edges.
- Cooked meat broth is the best media for growth or thioglycollate medium.

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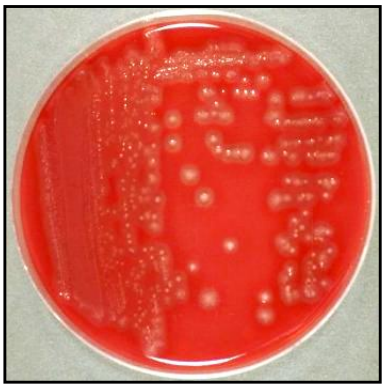
## Colony morphology



*C. perfringens*

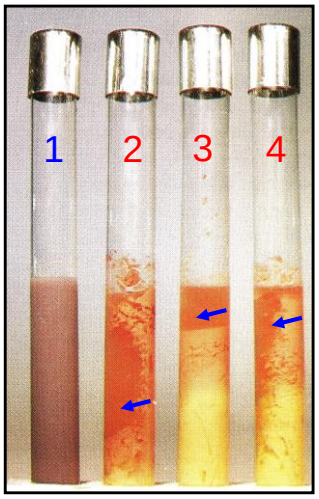
*C. tetani*



## Biochemical tests

| Species | Egg – yolk agar | | Hydrolysis of gelatin | Digestion of casein | Indole production | Acid production | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lecithinase | Lipase | | | | Glucose | Lactose | Sucrose | Maltose |
| *C. tetani* | - | - | + | - | V | - | - | - | - |
| *C. botulinum* | - | + | + | + | - | + | - | - | + |
| *C. perfringens* | + | - | + | + | - | + | + | + | + |

**variable =v**




## Litmus milk test

1- un inoculated media

2, 3, 4 the( stormy clot) reaction of three isolates with ***C. perfringens*** **in litmus milk medium**

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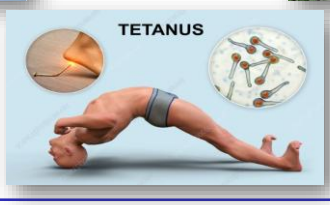
## Diseases

### *Clostridium tetani* (Tetanus)

*Clostridium tetani* usually enters the body through an open wound. It is a life-threatening disease, characterized by painful muscular spasms, and nervous system dysfunction.

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## Diseases

***Clostridium Perfringens type A*** **(Soft tissue infections)**

Causes gas gangrene (Myonecrosis) a life-threatening disease, and also causes food poisoning




## Diagnosis

**1- Specimen:** **Histological specimen** or **wound exudates**

- Histological specimens are transferred aseptically into a sterile screw-capped bottle.
- Specimens of exudates also specimens include: pus, necrotic tissue, feces, and food.

**2- Microscopical examination (Gram stain, Spore stain)**

- Gram-positive bacilli and sporulated.
- The spore is oval, sub-terminal or drumstick (tetanus).

**3- Culture:** **Anaerobically at 37 °C**

- **Cooked meat medium** → blackening of meat will observed with the production of $H_2S$ and $NH_3$
- **On blood agar** → β-hemolytic colonies


Thanks