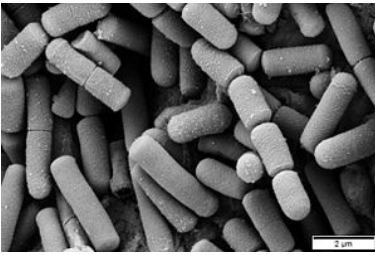


# Vaseksim

Bacillus cereus

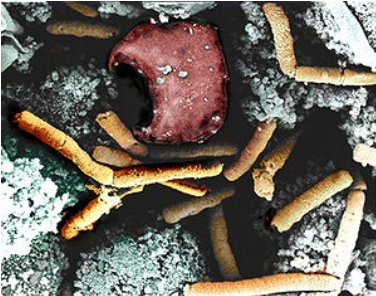
Bacillaceae



Bacillus

Bacillus cereus

<b>Morphology</b>	G + stick
<b>Relation to oxygen</b>	aerobic
<b>Cultivation</b>	common cultivation soils
<b>Virulence factors</b>	envelope and exotoxins
<b>Source</b>	raw materials of animal origin (wool, leather, meat, ...)
<b>Transmission</b>	ingestion, inhalation, skin contact
<b>Occurrence</b>	animals, human
<b>Disease</b>	anthrax
<b>Diagnostics</b>	direct microscopy, cultivation, animal experiment, ev. serology
<b>Therapy</b>	penicillin, erythromycin
<b>Vaccination</b>	aluminum hydroxide bound filtrate bound to aluminum hydroxide, formolized inactive vaccine
<b>MeSH ID</b>	D001409



Monkey spleen tissue with inhaled anthrax in an electron microscope. Yellow *Bacillus anthracis* , red erythrocyte.

*Bacillus anthracis* is the cause of **anthrax** (*splenic scabies*).

It is a gram-positive , aerobic, **sporulating** bacterium . They form disputes in the culture, soil, tissue and exudates of dead animals, but not in the blood or tissues of living animals. Disputes remain viable in the soil for several decades.

## Epidemiology, transmission and symptoms

Anthrax is and always will be a bigger threat to herbivores (cattle, sheep, goats, wild horses).

People become infected **through the skin** (direct contact with an infected animal, industrial production processing rawhide, wool, etc.), **inhalation** (pulmonary anthrax, *wool sorter's disease* ) or **ingesting the meat** of infected animals.

1. **The skin form** manifests itself as a reddish-brown papule , which changes into a pustula ( **pustula maligna** ), ev. carbuncle ( **carbunculus contagiosus** ), later with ulceration and the formation of the black eschar. There is usually a reaction of the nodes and general symptoms.
2. **The pulmonary form** is caused by the spread of the original skin infection or by inhalation of anthrax bacillus; has a severe course with pulmonary edema and respiratory failure. The thoracic nodes are affected, the inflammation has a hemorrhagic character.
3. **The gastrointestinal form** is very rare; hemorrhagic necrosis, mesenteric node reaction and sepsis occur in the intestinal wall.

## Pathogenesis

*B. anthracis* virulence factors include many exotoxins and envelope.

**Exotoxin: Plasmid** -encoded thermolabile and heterogeneous protein complex consisting of 3 parts:

- *Edema Factor* (EF)
- *Lethal Factor* (LF)
- *Protective Antigen* (PA)

In vivo , these 3 factors act synergistically. PA binds to eukaryotic cell surface receptors and is progressively cleaved by cellular proteases. The larger C-terminal portion of PA remains bound to the receptor and then binds either EF or LF, which enter the cell by endocytosis . EF acts as an adenylate cyclase. LF activates macrophages and cytokine production, leading to necrosis , fever , shock and death.

**Cover: The** capsule is a D-glutamic acid polypeptide that has an anti-phagocytotic effect.

## Diagnosis

Direct microscopy, cultivation, animal experiment, ev. serology. A professional medical history is important.

# Therapy

He is treated with antibiotics , megadoses of penicillin , streptomycin , or erythromycin . Furthermore, corticoids . General care is required. The mild topical form may not always require antibiotics. **The prognosis** of the pulmonary and intestinal forms is uncertain, with late treatment it can be fatal. Anthrax bacilli are being misused to make **biological weapons** .

# Links

## related articles

- ▪ Microbiology repetitorium

## References

- 
- 
- 
- GILLESPIE, SH and KB BAMFORD. *Medical Microbiology and Infection at a Glance*. 1st edition. London: Blackwell Science, 2000. ISBN 978-1405111737 .
- BERAN, GW and KB BAMFORD. *Handbook of Zoonoses, Section A: Bacterial, Rickettsial, Chlamydial and Mycotic*. 2nd edition. Florida: CRC Press, 1994. ISBN 978-0849332050 .
- University of South Carolina. *Microbiology and immunology online* [online]. © 2007. Last revision 2009, [cited. 2009-12-01]. < [http://www.sc.edu/study/colleges\\_schools/medicine/education/basic\\_science\\_departments/pathology\\_microbiology\\_and\\_immunology/index.php](http://www.sc.edu/study/colleges_schools/medicine/education/basic_science_departments/pathology_microbiology_and_immunology/index.php) ,>.

Bacteria	

coke	aerobic	<table><tr><td>Micrococcus</td><td>Micrococcus luteus</td></tr><tr><td>Rhodococcus</td><td>Rhodococcus equi</td></tr></table>	Micrococcus	Micrococcus luteus	Rhodococcus	Rhodococcus equi	
	Micrococcus	Micrococcus luteus					
	Rhodococcus	Rhodococcus equi					
facultatively anaerobic	<table><tr><td>Enterococcus</td><td>Enterococcus durans • Enterococcus faecalis • Enterococcus faecium</td></tr><tr><td>Streptococcus</td><td>Streptococcus agalactiae • Streptococcus mutans • Streptococcus pneumoniae • Streptococcus pyogenes • Streptococcus suis • Oral streptococci</td></tr><tr><td>Staphylococcus</td><td>Staphylococcus aureus • Staphylococcus epidermidis • Staphylococcus intermedius • Staphylococcus saprophyticus</td></tr></table>	Enterococcus	Enterococcus durans • Enterococcus faecalis • Enterococcus faecium	Streptococcus	Streptococcus agalactiae • Streptococcus mutans • Streptococcus pneumoniae • Streptococcus pyogenes • Streptococcus suis • Oral streptococci	Staphylococcus	Staphylococcus aureus • Staphylococcus epidermidis • Staphylococcus intermedius • Staphylococcus saprophyticus
Enterococcus	Enterococcus durans • Enterococcus faecalis • Enterococcus faecium						
Streptococcus	Streptococcus agalactiae • Streptococcus mutans • Streptococcus pneumoniae • Streptococcus pyogenes • Streptococcus suis • Oral streptococci						
Staphylococcus	Staphylococcus aureus • Staphylococcus epidermidis • Staphylococcus intermedius • Staphylococcus saprophyticus						
anaerobic	<table><tr><td>Peptococcus</td><td>Peptococcus niger</td></tr><tr><td>Peptostreptococcus</td><td>Peptostreptococcus anaerobius • Peptostreptococcus prevotii • Peptostreptococcus vaginalis</td></tr></table>	Peptococcus	Peptococcus niger	Peptostreptococcus	Peptostreptococcus anaerobius • Peptostreptococcus prevotii • Peptostreptococcus vaginalis		
Peptococcus	Peptococcus niger						
Peptostreptococcus	Peptostreptococcus anaerobius • Peptostreptococcus prevotii • Peptostreptococcus vaginalis						

sticks	aerobic + facultative anaerobic	<table><tr><td>Arcanobacter</td><td>Arcanobacterium haemolyticum</td></tr><tr><td>Bacillus</td><td>Bacillus anthracis • Bacillus cereus</td></tr><tr><td>Corynebacterium</td><td>Corynebacterium diphtheriae • Corynebacterium jeikeium • Corynebacterium ulcerans • Corynebacterium urealyticum</td></tr><tr><td>Erysipelothrix</td><td>Erysipelothrix rhusiopathiae</td></tr><tr><td>Listeria</td><td>Listeria monocytogenes</td></tr><tr><td>Nocardia</td><td>Nocardia asteroides • Nocardia brasiliensis</td></tr><tr><td>Rhodococcus</td><td>Rhodococcus equi</td></tr></table>	Arcanobacter	Arcanobacterium haemolyticum	Bacillus	Bacillus anthracis • Bacillus cereus	Corynebacterium	Corynebacterium diphtheriae • Corynebacterium jeikeium • Corynebacterium ulcerans • Corynebacterium urealyticum	Erysipelothrix	Erysipelothrix rhusiopathiae	Listeria	Listeria monocytogenes	Nocardia	Nocardia asteroides • Nocardia brasiliensis	Rhodococcus	Rhodococcus equi
	Arcanobacter	Arcanobacterium haemolyticum														
	Bacillus	Bacillus anthracis • Bacillus cereus														
	Corynebacterium	Corynebacterium diphtheriae • Corynebacterium jeikeium • Corynebacterium ulcerans • Corynebacterium urealyticum														
	Erysipelothrix	Erysipelothrix rhusiopathiae														
	Listeria	Listeria monocytogenes														
	Nocardia	Nocardia asteroides • Nocardia brasiliensis														
	Rhodococcus	Rhodococcus equi														
	anaerobic	<table><tr><td>Actinomyces</td><td>Actinomyces israeli • Actinomyces naeslundii</td></tr><tr><td>Bifidobacterium</td><td>Bifidobacterium dentium</td></tr><tr><td>Clostridium</td><td>Clostridium botulinum • Clostridium difficile • Clostridium novyi • Clostridium tetani • Clostridium perfringens • Clostridium septicum • Clostridium ulcerans</td></tr><tr><td>Lactobacillus</td><td>Lactobacillus acidophilus</td></tr><tr><td>Propionibacterium</td><td>Propionibacterium acnes • Propionibacterium propionicus</td></tr></table>	Actinomyces	Actinomyces israeli • Actinomyces naeslundii	Bifidobacterium	Bifidobacterium dentium	Clostridium	Clostridium botulinum • Clostridium difficile • Clostridium novyi • Clostridium tetani • Clostridium perfringens • Clostridium septicum • Clostridium ulcerans	Lactobacillus	Lactobacillus acidophilus	Propionibacterium	Propionibacterium acnes • Propionibacterium propionicus				
	Actinomyces	Actinomyces israeli • Actinomyces naeslundii														
	Bifidobacterium	Bifidobacterium dentium														
	Clostridium	Clostridium botulinum • Clostridium difficile • Clostridium novyi • Clostridium tetani • Clostridium perfringens • Clostridium septicum • Clostridium ulcerans														
	Lactobacillus	Lactobacillus acidophilus														
	Propionibacterium	Propionibacterium acnes • Propionibacterium propionicus														

coke	aerobic	<table><tr><td>Acinetobacter</td><td>Acinetobacter calcoaceticus</td></tr><tr><td>Moraxella</td><td>Moraxella catarrhalis • Moraxella lacunata</td></tr><tr><td>Neisseria</td><td>Neisseria gonorrhoeae • Neisseria meningitidis • Non-pathogenic species of Neisseria</td></tr></table>	Acinetobacter	Acinetobacter calcoaceticus	Moraxella	Moraxella catarrhalis • Moraxella lacunata	Neisseria	Neisseria gonorrhoeae • Neisseria meningitidis • Non-pathogenic species of Neisseria
	Acinetobacter	Acinetobacter calcoaceticus						
	Moraxella	Moraxella catarrhalis • Moraxella lacunata						
	Neisseria	Neisseria gonorrhoeae • Neisseria meningitidis • Non-pathogenic species of Neisseria						
anaerobic	<table><tr><td>Veillonella</td><td>Veillonella alcalescens • Veillonella parvula</td></tr></table>	Veillonella	Veillonella alcalescens • Veillonella parvula					
Veillonella	Veillonella alcalescens • Veillonella parvula							

cocobacilli	aerobic	<table><tr><td>Rickettsia</td><td>Rickettsia prowazekii • Rickettsia rickettsii • Rickettsia typhi</td></tr></table>	Rickettsia	Rickettsia prowazekii • Rickettsia rickettsii • Rickettsia typhi
Rickettsia	Rickettsia prowazekii • Rickettsia rickettsii • Rickettsia typhi			

--	--	--

sticks

aerobic	<i>Alcaligentes</i>	<i>Alkaligentes feacalis</i>
	<i>Bartonella</i>	<i>Bartonella bacilliformis</i> • <i>Bartonella henselae</i> • <i>Bartonella quintana</i>
	<i>Bordetella</i>	<i>Bordetella bronchiseptica</i> • <i>Bordetella parapertussis</i> • <i>Bordetella pertussis</i>
	<i>Brucella</i>	<i>Brucella abortus</i> • <i>Brucella canis</i> • <i>Brucella melitensis</i> • <i>Brucella suis</i>
	<i>Burkholderia</i>	<i>Burkholderia cepacia</i> • <i>Burkholderia mallei</i> • <i>Burkholderia pseudomallei</i>
	<i>Francisella</i>	<i>Francisella tularensis</i>
	<i>Legionella</i>	<i>Legionella pneumophila</i>
	<i>Kingella</i>	<i>Kingella denitrificans</i> • <i>Kingella kingae</i> • <i>Kingella oralis</i>
	<i>Pseudomonas</i>	<i>Pseudomonas aeruginosa</i> • <i>Pseudomonas fluorescens</i>
	<i>Stenotrophomonas</i>	<i>Stenotrophomonas maltophilia</i>
facultatively anaerobic	<i>Actinobacillus</i>	<i>Actinobacillus equi</i> • <i>Actinobacillus lignieresii</i>
	<i>Aeromonas</i>	<i>Aeromonas caviae</i> • <i>Aeromonas hydrophila</i> • <i>Aeromonas sobria</i>
	<i>Afipia</i>	<i>Afipia felis</i>
	<i>Citrobacter</i>	<i>Citrobacter freundii</i> • <i>Citrobacter koseri</i>
	<i>Eikenella</i>	<i>Eikenella corrodens</i>
	<i>Enterobacter</i>	<i>Enterobacter aerogenes</i> • <i>Enterobacter cloacae</i>
	<i>Escherichia</i>	<i>Escherichia coli</i>
	<i>Haemophilus</i>	<i>Haemophilus ducreyi</i> • <i>Haemophilus haemolyticus</i> • <i>Haemophilus influenzae</i> • <i>Haemophilus parainfluenzae</i>
	<i>Klebsiella</i>	<i>Klebsiella granulomatis</i> • <i>Klebsiella oxytoca</i> • <i>Klebsiella pneumoniae</i>
	<i>Pasteurella</i>	<i>Pasteurella haemolytica</i> • <i>Pasteurella multocida</i> • <i>Pasteurella ureae</i>
	<i>Plesiomonas</i>	<i>Plesiomonas shigelloides</i>
	<i>Proteus</i>	<i>Proteus mirabilis</i> • <i>Proteus vulgaris</i>
	<i>Salmonella</i>	<i>Salmonella</i> Enteritidis • <i>Salmonella</i> Typhi • <i>Salmonella</i> Paratyphi
	<i>Serratia</i>	<i>Serratia marcescens</i>
	<i>Shigella</i>	<i>Shigella boydii</i> • <i>Shigella dysenteriae</i> • <i>Shigella flexneri</i> • <i>Shigella sonnei</i>
	<i>Vibrio</i>	<i>Vibrio cholerae</i> • <i>Vibrio parahaemolyticus</i>
	<i>Yersinia</i>	<i>Yersinia enterocolitica</i> • <i>Yersinia pestis</i> • <i>Yersinia pseudotuberculosis</i>
microaerophilic	<i>Campylobacter</i>	<i>Campylobacter coli</i> • <i>Campylobacter fetus</i> • <i>Campylobacter jejuni</i>
	<i>Helicobacter</i>	<i>Helicobacter pylori</i>
anaerobic	<i>Bacteroides</i>	<i>Bacteroides fragilis</i> • <i>Bacteroides vulgatus</i>
	<i>Fusobacterium</i>	<i>Fusobacterium necrophorum</i> • <i>Fusobacterium nucleatum</i> • <i>Fusobacterium stabile</i>
	<i>Leptotricha</i>	<i>Leptotricha buccalis</i>
	<i>Mobiluncus</i>	<i>Mobiluncus curtisii</i> • <i>Mobiluncus mulieris</i>
	<i>Prevotella</i>	<i>Prevotella melaninogenica</i>
	<i>Porphyromonas</i>	<i>Porphyromonas gingivalis</i>

acid resistant	<div>sticks</div> <div> <div>aerobic</div> <div> <i>Mycobacterium</i> <i>Atypical mycobacteria • Mycobacterium tuberculosis • Mycobacterium leprae</i> </div> </div>
non-stainable G +/-	<div>spiral</div> <div> <div>strictly aerobic</div> <div> <i>Leptospira</i> <i>Leptospira biflexa • Leptospira interrogans • Leptospira parva</i> </div> </div> <div> <div>microaerophilic</div> <div> <i>Borrelia</i> <i>Borrelia burgdorferi • Borrelia hermsi • Borrelia recurrentis • Borrelia vincenti</i> </div> </div> <div> <div>strictly anaerobic</div> <div> <i>Treponema</i> <i>Non-pathogenic treponems • Treponema carateum • Treponema pallidum • Treponema phagedenis • Treponema pertenue</i> </div> </div>

Category :

- Microbiology
- Pathology
- Infectious diseases
- Hygiene
- Epidemiology
- Bacteria