

Bacillus cereus

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GENERAL INFORMATION

Bacillus cereus

For further information on the current nomenclature of the species see [List of Prokaryotic names with Standing in Nomenclature](#)

Bacillus cereus biovar *anthracis* will be handled in a separate data sheet.

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Category: Bacteria

Strain type: Bacillus cereus (Frankland and Frankland 1887):
DSM 31,
ATCC 14579,
CCM 2010,
LMG 6923,
NCBI 9373
NCTC 2599

Further information:
[BacDive - The Bacterial Diversity Metadatabase \(DSMZ\)](#)

Risk group: 2
 Biological agents that can cause human disease and might be a hazard to employees; they are unlikely to spread to the community; there is usually effective prophylaxis or treatment available.

References:

Note T:
 Toxin production: prokaryotes capable of forming exotoxins. The "T" tag lays no claim to completeness, however, i.e. exotoxin-forming strains may also arise in types of prokaryote without this tag. The "T" tag adopted over from Annex III of Directive 2000/54/EC.

Note TA:
 Types of which strains are known which have been handled safely over many years in technical applications. These proven strains can therefore be assigned to risk group 1 according to the classification criteria. The "TA" tag lays no claim of completeness, however. Strains with the features of "TA" may therefore also arise in species not bearing this tag.

Consultant / Reference laboratory:

The Robert Koch Institute [Robert-Koch-Institut] has not appointed a consultant or reference laboratory for *Bacillus cereus* for the period of 2017 to 2019. However, there is a consultant laboratory for *Bacillus anthracis* which must also keep *Bacillus cereus* for comparison and therefore has experience with *Bacillus cereus*.

Consulting laboratory for *Bacillus anthracis*:

Robert Koch Institute [Robert-Koch-Institut]

ZBS 2 - Highly pathogenic microbial pathogens

Seestr. 10

13353 Berlin, Germany

Homepage: www.rki.de/kl-anthrax

Contact: PD Dr Roland Grunow (head), Dr Silke Klee, Dr Daniela Jacob

Phone: 030 18754 - 2100

Fax: 030 18754 -2110

E-mail: GrunowR@rki.de

The Friedrich Loeffler Institute [Friedrich-Loeffler-Institut] also shows a reference laboratory for *Bacillus anthracis*:

National Reference Laboratory for Anthrax [Nationales Referenzlabor für Milzbrand]

at the Institute for Bacterial Infections and Zoonoses

[Institut für bakterielle Infektionen und Zoonosen (IBIZ)]

Friedrich Loeffler Institute [Friedrich Loeffler Institut],

Jena branch,

Naumburger Str. 96 a,

07743 Jena, Germany

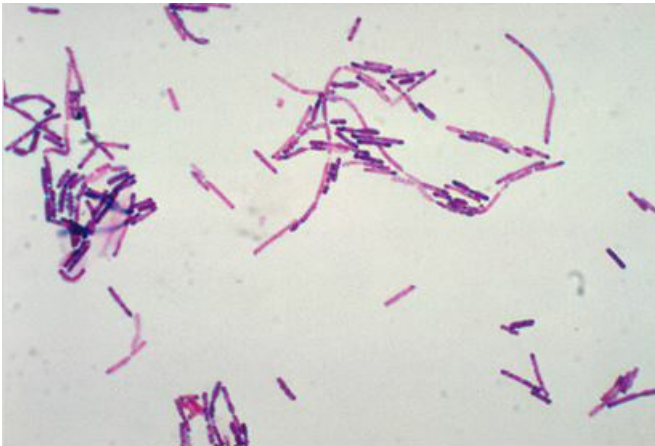
Contact: Dr Mandy Elschner

Tel.: +49 3641 804-2428

Fax: +49 3641 804-2228

E-mail: Mandy.Elschner@fli.de

Otherwise, all clinical-microbiology laboratories of university institutes for medical microbiology and hygiene are suitable for providing information on human infections due to *Bacillus cereus*.



Bacillus cereus: The plump, Gram-positive bacilli have partly formed spores which appear as a central brighter area. In older cultures, the bacteria do not all stain equally, so that they appear Gram-labile. Stain according to Gram, magnification: 1000x.
Photo: <https://phil.cdc.gov/phil/home.asp>

Medical significance

Bacillus cereus is a spore forming soil inhabitant and can be isolated from nearly all soil samples, as well as various agricultural products. Together with *Bacillus anthracis* and *Bacillus thuringiensis*, *Bacillus cereus* is in a group of closely genetically related bacteria which can exchange virulence plasmids with each other. *Bacillus cereus* is of particular significance as a food-poisoning agent. Since the spores survive boiling processes or pasteurisation, the bacteria may germinate and reproduce when previously cooked foods, particularly those high in starches such as rice, noodles, potatoes or puddings, are kept warm. If pathogen counts exceed 10⁴ grams, the affected food may become poisoned by various emetic toxins (cereulides) and a diarrhoea toxin. The emetic toxins trigger vomiting, diarrhoea and rarely abdominal cramps within a period of half an hour to six hours. The severity of the course of illness depends on the type of triggering cereulide. Cereulides are heat and acid resistant. After 8 - 16 hours, the diarrhoea toxin triggers watery diarrhoea which subsides spontaneously after no more than two days. The diarrhoea toxin is heat and acid-sensitive. If pasteurised milk is contaminated by *Bacillus cereus*, it assumes a foul odour and becomes unpalatable. Therefore, *Bacillus cereus* poisoning due to spoiled milk is rare.

Breastmilk in breastmilk collection facilities or manufactured baby food which are contaminated by *Bacillus cereus* may cause sepsis in babies.

In persons with impaired immune defences, alcoholism or intravenous drug abuse, *Bacillus cereus* may cause various severe infections or sepsis.

In case of eye injuries, *Bacillus cereus* may cause severe endophthalmitis which rapidly results in loss of the eye.

Due to their relatively close relation to *Bacillus anthracis*, some strains of *Bacillus cereus* (*B. cereus*, biovar *anthracis*) were able to take over the key plasmids for the anthrax toxin and envelope formation, and therefore trigger anthrax in various animals. This observation was thus far made only in wild animals in Africa. In humans, cases of anthrax due to *Bacillus cereus* biovar *anthracis* were not observed thus far. Like *Bacillus anthracis*, *Bacillus cereus* biovar *anthracis* is therefore classified in risk group 3 and requires special safety precautions when handling (see document no.: 820789).

Reference: 03068 04559 04560 10223 24371 24372 24374 24376 24379

Transmission routes

Admission over the mouth.

The transmission takes place due to food.

Splash in the eyes or mucous membranes of the mouth must be considered as portal of entry.

Reference: 99999

For further information on transmission routes see chapter EPIDEMIOLOGY.

OCCUPATIONAL SAFETY AND HEALTH

Sector | Activity | Protective measures | Inactivation/Decontamination | Immediate measures/First aid | Occupational health care

SECTORS

- Foods industry (convenience foods)
- Community kitchens
- Large-scale kitchens
- Dairy kitchens

Reference: 99999

ACTIVITIES

- Testing of convenience foods,
- Handling of cadavers in tropical regions (depending on the risk assessment, work at protection level 3 must be carried out here).

Reference: 03068 04560 24371

PROTECTIVE MEASURES

General protective measures

No measures beyond the protective measures specified for the respective activity are required.

The following protective measures apply to specific activities in laboratories, the husbandry of laboratory animals and biotechnological activities. For further information see [TRBA 100](#), [TRBA 120](#), [TRBA 500](#).



Technical measures

Where tasks intentionally involve biomaterials, their identity must be verified and documented routinely.

Areas in which the biomaterial is processed must be isolated from other areas and labelled with the 'Biohazard' warning symbol and protection level 2.

The doors of the area within which the protection level applies must open in the direction of the escape route and be equipped with an inspection window.

Where a health hazard posed by bioaerosols cannot be eliminated, the relevant activities must be performed in a microbiological safety cabinet (MSC). For detailed information on activities in MSCs, see leaflet B 011 of the BG RCI (German Social Accident Insurance Institution for the raw materials and chemical industry).

Wash basins, disinfectant dispensers, disposable towels and hand detergents must be available. Water faucets and disinfectant dispensers must be operable without the use of the hands.

Laboratories must offer suitable eyewash facilities.

All surfaces and areas that could come into contact with biological agents must be easy to clean, liquid-tight and resistant to detergents and disinfectants. A seamless wall-floor joint must be effected.

Windows and doors must be kept closed while work is in progress.

Work areas are to be maintained in a clean and tidy state. Only tools and devices that are actually needed may remain on the benches.

Pipettors must be provided and used. Mouth pipetting is not permitted.

If the use of pointed or sharp instruments cannot be avoided, they must be disposed of in suitable containers after use.

The release of biological agents must be minimised during the opening of technical equipment.

Catch basins must be in place to ensure that open sample containers are prevented from turning over during work operations.

The biomaterial must not be stored under conditions that favour its reproduction.

Clearly labelled, closed, rigid, liquid-tight and unbreakable vessels that can be disinfected from the outside must be provided and used for the in-house transport of biological agents.

Transport of biological agents outside the plant is subject to the regulations governing hazardous goods (class 6.2).

Suitable containers must be available for the collection of waste that constitutes biological agents.

Organisational measures

The number of staff must be limited to the actual requirements, and access to the area in which the protection level applies must be restricted to authorized persons.

An instruction manual must be prepared. Prior to beginning their activity and subsequently at least once a year, verbal and work-related instruction must be provided to staff members to familiarise them with the hazards and protective measures as laid down in the instruction manual. DGUV Informative Publication 213-016 (BGI/GUV-I 853) contains a prototype instruction manual on 'activities involving biological agents of Risk Group 2' in accordance with the German Ordinance on Biological Substances.

The instruction process must also include advice in occupational medicine and safety.

Restrictions of employment for expectant and nursing mothers must be observed in accordance with the German Maternity Protection Act.

Injuries must be reported immediately to the person in charge.

Personal protection - body protection

Suitable protective clothing must be worn (at least lab coats).
During the processing of infectious tissues, the protective clothing must be complemented by disposable aprons.
Remove protective clothing when leaving the area in which the protection level applies.
Keep protective clothing separate from normal clothing.

Personal protection - hand protection

Depending on the results of the risk assessment, the use of protective gloves may be mandatory for certain activities.
The skin protection plan must be observed.

Personal protection – eye and face protection

Depending on the results of the risk assessment, protective goggles or face protection may be necessary.

Personal protection - respiratory protection

Depending on the results of the risk assessment, a respiratory protection device may be necessary. Respiratory protection equipment must be worn for only a limited period of time. This period must be defined in the risk assessment.

Occupational hygiene

The consumption and storage of food and alcohol/tobacco in the protection level area is forbidden. The wearing of jewellery, watches and rings on the hands and the forearms is not permitted. Fingernails are to be kept short.
Following completion of work and prior to leaving the work area, hands are to be disinfected, washed and re-moisturised according to the skin protection plan.
Skin protection and skin care agents must be made available in contamination-proof containers. Contaminated protective clothing and shoes are to be collected safely and decontaminated, cleaned and disposed of centrally.
Work clothing must not be cleaned at home.
The cleaning regulations for employees, equipment and workplaces must be defined in a hygiene plan.
Insects and pests in the working area must be regularly controlled.
Provide information about the possibility that *Bacillus cereus* may reproduce in pasteurised or cooked foods.

Vaccination

A vaccine is not available.

Reference: [00001 99999](#)

INACTIVATION / DECONTAMINATION

Disinfection measures must be carried out by proven means and procedures. For detailed information see the following lists: DVG - Animal Husbandry (German Association for Veterinary Medicine, Accommodation and Husbandry of Animals), DVG - Food Area, [VAH](#) and RKI. Officially ordered disinfection measures (decontamination) required by the authorities may be carried out only with disinfection agents included in the [RKI list](#).

Furthermore, the Industrie Association Hygiene and Surface Protection ([HO](#)) supplies lists of statements of companies on the efficacy of different products. The information in this register is based on statements of the respective companies.

Bacillus cereus can be safely inactivated with all approved sterilisation methods.

Disinfection is only possible with sporicidal agents.

A suitable autoclave must be available in the same building.

Externally contaminated test vessels must be disinfected before opening.

Work areas and working equipment must be decontaminated before the performance of maintenance measures. For further information see [TRBA 100](#) ('Technical Rules for Biological Agents').

Contaminated solid wastes, liquid cultures and suspensions containing pathogens are to be collected in appropriate containers and deactivated.

Reference: [00001 99999](#)

IMMEDIATE MEASURES / FIRST AID / POST-EXPOSURE PROPHYLAXIS

Accidental release measures

None.

First aid: eyes and mucous membranes

Wash the eyes with a disposable eyewash bottle. Since permanently installed eye showers are generally not maintained at all or only infrequently and are therefore usually lined with a biofilm, which may also contain *Pseudomonas* spp., treating injured eyes in particular with a disposable eyewash bottle is the safest method of removing foreign materials or microorganisms from the eye. In case of an eye injury, immediate medical care and antibiotic prophylaxis is required.

First aid: skin

Wash with water and soap.

First aid: respiratory tract

None.

First aid: swallowing

No First Aid measures are required if some released bacteria are swallowed. However, the affected individual should be instructed to vomit if a food is swallowed in which *Bacillus cereus* was able to reproduce for many hours and produce toxins. Since the taste of such foods, particularly milk, is altered and impaired by *Bacillus cereus*, they are usually spat out.

Information for physicians

Bacillus cereus is found everywhere in the environment and is deemed non-hazardous for healthy, immunocompetent persons in low pathogen counts.

Bacillus cereus is only able to develop pathogenic toxin quantities in foods if it reproduces to more than 10⁴ bacteria per gram. This reproduction only occurs if previously cooked foods are not immediately cooled to 7°C and stored at this temperature, or if the refrigeration chain was interrupted. *Bacillus cereus* does not reproduce in sour milk products.

Symptoms of poisoning include nausea, vomiting, fever, diarrhoea and abdominal cramps. These symptoms usually disappear spontaneously after one to two days. However, there are also severe courses of this food intoxication, which then require hospital care and infusion treatment.

If an eye injury has occurred while handling *Bacillus cereus*, the affected individual must immediately see an ophthalmologist and requires prophylaxis with antibiotics.

In persons with weakened immune defences and in infants, *Bacillus cereus* may cause various systemic infections and sepsis.

Reference: 10222 10223 24374 99999

OCCUPATIONAL HEALTH CARE according to ArbMedVV**Optional health care:**

In the case of tasks specifically involving contact and tasks involving incidental contact with exposure to toxic biological agents, the employer must offer an optional health care.

An optional health care must also be offered if as a result of the exposure to biological agents

- a serious infectious illness is to be expected and post-exposure prophylactic measures are possible,
- or
- an infection has resulted.

MORPHOLOGY AND PHYSIOLOGY**MORPHOLOGY**

Bacillus cereus is a Gram-positive bacillus with a length of 1.4 µm and a diameter of approx. 0.8 µm. The bacteria are usually positioned in chains and have a decentrally located, oval spore which does not enlarge the bacterial cell. *Bacillus cereus* is peritrichously (all around) flagellated and therefore motile.

Reference: 03068 10223

PHYSIOLOGY

Bacillus cereus is a facultative anaerobe, motile spore former. The spores survive the normal cooking process for foods. The ideal reproductive temperature is at 37°C with a range from 15°C to 45°C. *Bacillus cereus* can also reproduce at refrigerator temperatures, but only very slowly in this case. *Bacillus cereus* no longer reproduces below a pH of 4.8.

Bacillus cereus produces various emetic toxins (cereulides) which are heat and acid-resistant, and a diarrhoea toxin which is heat and acid-sensitive. There have been reports of strains of *Bacillus cereus* which were able to take over the key plasmids for the toxin and envelope formation which is responsible for the pathogenesis of *Bacillus anthracis* from this bacterium, and can therefore trigger anthrax.

Reference: [03068 10223 24371](#)

INFORMATION ON MOLECULAR BIOLOGY

Genome

Numerous strains of *Bacillus cereus* have been completely sequenced, including the type strain ATCC 14579. The genome has a size of 5.288 to 6.113 mega base pairs. Most strains have one or more plasmids.

Its GC content is between 34.91% and 35.54%.

Reference: [24378](#)

OCCURRENCE / NATURAL HABITAT

FREE-LIVING / HOST BOUND

This biological agent is free-living.

This biological agent is host dependent-commensalic.

Reference: [99999](#)

HOSTS

Humans and animals.

Reference: [99999](#)

VECTORS

No specific vectors are required.

Reference: [99999](#)

GEOGRAPHIC DISTRIBUTION

Worldwide.

Reference: [99999](#)

PATHOGENICITY / PATHOGENIC PROPERTIES

CHARACTERISTIC OF PATHOGENICITY

Facultative human-pathogenic (it does not necessarily cause diseases in humans).

Only *Bacillus cereus* biovar *anthracis* is able to trigger disease.

Reference: [24371 99999](#)

MINIMUM INFECTIOUS DOSE (MID)

There is no known infectious dose for infecting persons with weakened immune systems or infants. At a bacterial content of 10^4 per gram of food, it must be assumed that pathogenic quantities of toxins which can trigger food poisoning were formed.

Reference: [10222](#)

CARCINOGENICITY / MUTAGENICITY / REPRODUCTIVE TOXICITY

There is no known carcinogenicity, mutagenicity or reproductive toxicity in *Bacillus cereus*.

Reference: [99999](#)

ALLERGENICITY / SENSITISING EFFECT

An allergic / sensitising potential is not known.

Reference: [99999](#)

TOXIGENICITY / TOXIN FORMATION

Bacillus cereus forms various emetic toxins (cereulides) which trigger nausea, vomiting, fever, diarrhoea and abdominal cramps after a short time. Cereulides are heat and acid resistant. *Bacillus cereus* also forms a diarrhoea toxin which triggers watery diarrhoea after 8 - 16 hours. The diarrhoea toxin is heat and acid-sensitive. Food poisoning symptoms are self-limiting in most cases, and stop after no more than two days.

Due to its close relation to *Bacillus anthracis*, one strain of *Bacillus cereus* biovar *anthracis* (risk group 3) has taken over and expressed the virulence plasmids which code for the anthrax toxin and the envelope. Therefore, anthrax can also be caused by *Bacillus cereus* biovar *anthracis*, which has thus far been observed in animals only, but not in humans.

Nonetheless, this finding represents bioterrorism competence of *Bacillus cereus* biovar *anthracis*

Reference: [04558](#) [24373](#) [24376](#)

DISEASE

DESCRIPTION

Food poisoning due to *Bacillus cereus*.

Reference: [99999](#)

ZOONOSIS

Zoonosis (transmission between animals and humans): Yes

Food poisoning due to *Bacillus cereus* is not a zoonosis, even though *Bacillus cereus* can also be found in the intestines of animals.

Reference: [99999](#)

INFECTIOUS STAGES

The bacteria can always have infectious effects.

The patients can also always develop infectious effects. Particular infectious stages of the bacteria are not known.

Reference: [99999](#)

INCUBATION PERIOD

Depending on the toxin which has accumulated in foods, the incubation period may range from 30 minutes to six hours or 8 - 16 hours.

Reference: [10222](#) [10223](#)

PATENCY

No statement is possible, since *Bacillus cereus* is found in the intestine of humans and animals and can be excreted at any time.

Reference: [99999](#)

SYMPTOMS AND COURSE OF DISEASE

Food poisoning due to *Bacillus cereus* starts after approx. one half to six hours with nausea, chills, vomiting, diarrhoea and sometimes abdominal cramping. Symptoms subside after a day in most cases.

The diarrhoea toxin causes a slightly different course: Watery diarrhoea starts after 8 - 16 hours and stops again after no more than two days. Since several toxins can be expressed simultaneously, the symptoms may overlap.

The course of the food poisoning may be severe requiring hospital treatment with infusion treatment.

Persons with weakened immune systems and infants may suffer infections of various organ systems by *Bacillus cereus*, which may develop into sepsis. If an infection with *Bacillus cereus* is present in a penetrating eye injury, this may rapidly result in loss of the eye.

Reference: [03068](#) [10222](#) [10223](#)

LETHALITY

Persons with competent immune systems survive food poisoning due to *Bacillus cereus*. Systemic infections or sepsis may take a fatal course in individuals with weakened immune systems or in infants.

Reference: [24375](#) [24377](#)

THERAPY

Food poisoning cases receive symptomatic treatment. In severe courses, hospital treatment with infusion treatment may become necessary. Antibiotics are generally not required in these cases. Systemic infections due to *Bacillus cereus* in individuals with weakened immune systems or in infants require treatment with antibiotics; carbapenems or aminoglycoside antibiotics or suitable combinations must be used in these cases.

Reference: [10223](#) [24380](#)

PROPHYLAXIS

The best prophylaxis against food poisoning consists of immediately cooling pre-cooked or pasteurised foods or convenience foods immediately, and strictly maintaining the refrigeration chain below 7°C.

Reference: [10222](#)

EPIDEMIOLOGY

TRANSMISSION ROUTES / PORTALS OF ENTRY

Transmission takes place orally (by ingestion).

Other transmission routes and entry paths are possible in persons with weakened immune systems (e.g. catheter, implants, endoscope).

Reference: [99999](#)

PATHOGEN RESERVOIR

Bacillus cereus can be found anywhere in the environment and has no special pathogen reservoir.

Reference: [99999](#)

INCIDENCE

Bacillus cereus is one of the common causes of food poisoning; repeated minor outbreaks are reported repeatedly.

Reference: [04560](#)

RESISTANCE / TENACITY

SPORULATION

Forms spores.

Reference: [99999](#)

CONIDIA FORMATION

Does not form conidia.

Reference: [99999](#)

RESISTANCES

Reference: [10223](#)

LEGAL PRINCIPLES / REGULATIONS

LAWS AND ORDINANCES

Ordinance on Safety and Health Protection at Workplaces Involving Biological Agents (Biological Agents Ordinance - [BioStoffV](#))

Law for the regulation of genetic engineering (Genetic Engineering Act - [GenTG](#)) and associated regulations (only in German).

Public notice of the list risk-rated donor organisms and recipient organisms for genetic engineering of 5. July 2013

Law on the prevention and control of infectious diseases in humans (Infection Protection Act - [IfSG](#)) (only in German)

Ordinance on Occupational Health Care ([ArbMedVV](#))

Rules for [transportation of dangerous goods](#):

- European Convention on the carriage of dangerous goods by road ([ADR](#))
- Order concerning the International Carriage of Dangerous Goods by Rail (RID)
- International Air Transport Association ([IATA](#)), dangerous goods regulation, 54th edition 2013
- the law on the transport of dangerous goods (Gefahrgutbeförderungsgesetz". - [GGBefG](#))
- Regulation on the national and international transport of dangerous goods by road, rail and inland waterway services (Dangerous Goods Regulations, road, rail and inland waterways - [GGVSEB](#))
- Regulation on the International Maritime Dangerous Goods (Dangerous Goods Regulations lake - [GGVSee](#))
- Regulation on the order of advisor and the training of the persons in businesses and enterprises (Dangerous Goods Advisor Ordinance - GBV) (only in German)

Regulation to protect against hazardous substances (Hazardous Substance Ordinance - [GefStoffV](#)) (only in German)

TECHNICAL RULES AND OTHER REGULATIONS

[TRBA 100](#)

Protective measures for activities involving biological agents in laboratories

[TRBA 250](#)

Biological agents in health care and welfare facilities

[TRBA 400](#)

Guideline for risk assessment and for the instruction of employees in relation to activities with biological agents

[TRBA 450](#)

Criteria for the classification of biological agents

[TRBA 466](#)

Classification of prokaryotes (bacteria and archaea) into risk groups (only in German)

[TRBA 500](#)

Basic measures to be taken for activities involving biological agents

LINKS

Public Health Agency of Canada (PHAC)

[Information provided by the Public Health Agency of Canada to this pathogen](#)

Further Links:

[Information provided by the U.S. Food and Drug Administration](#)

REFERENCES

[General information](#) | [Occupational and health protection](#) | [Morphology and physiology](#) | [Occurrence/natural habitat](#) | [Pathogenicity/pathogenic properties](#) | [Disease](#) | [Epidemiology](#) | [Resistance/Tenacity](#) | [Legal basics](#) | [Links](#) | [References](#)

Quelle: 00001

Informationen aus den Technischen Regeln für Biologische Arbeitsstoffe, insbesondere aus: Information from the technical rules for biological substances, in particular from:

- [TRBA 100](#)

Schutzmaßnahmen für Tätigkeiten mit biologischen Arbeitsstoffen in Laboratorien; Ausgabe: Oktober 2013, geändert 2014

Protective measures for activities involving biological agents in laboratories; Edition: October 2013, amended 2014

- [TRBA 120](#)

Versuchstierhaltung; Ausgabe: Juli 2012, geändert 2017

Experimental animal husbandry; Edition July 2012, amended 2017

- [TRBA 500](#)

Grundlegende Maßnahmen bei Tätigkeiten mit biologischen Arbeitsstoffen; Ausgabe: April 2012

Basic measures to be taken for activities involving biological agents; Edition April 2012

Quelle: 01466

[TRBA 466](#)

Einstufung von Prokaryonten (Bacteria und Archaea) in Risikogruppen; Ausgabe: August 2015,

zuletzt geändert: GMBL Nr. 25-31 vom 14. August 2019, S. 478

Classification of prokaryotes (bacteria and archaea) in risk groups; Edition August 2015, last amended August 2019

Quelle: 02014

Verordnung zur arbeitsmedizinischen Vorsorge ([ArbMedVV](#))

Ordinance on Occupational Health Care ([ArbMedVV](#))

Quelle: 03068

James H. Jorgensen, Michael A. Pfaller, Karen C. Carroll, Guido Funke, Marie Louise Landry, Sandra S. Richter, David W. Warnock, Manual of Clinical Microbiology, Eleventh Edition, ASM Press, Washington 2015

Quelle: 04558

Ehling-Schulz M, Fricker M, Grallert H, Rieck P, Wagner M, Scherer S.: Cereulide synthetase gene cluster from emetic *Bacillus cereus*: structure and location on a mega virulence plasmid related to *Bacillus anthracis* toxin plasmid pXO1. BMC Microbiol. 2006 Mar 2;6:20.

Quelle: 04559

Constanze Hoffmann, Fee Zimmermann, Roman Biek, Hjalmar Kuehl, Kathrin Nowak, Roger Mundry, Anthony Agbor, Samuel Angedakin, Mimi Arandjelovic, Anja Blankenburg, Gregory Brazolla, Katherine Corogenes, Emmanuel Couacy-Hymann, Tobias Deschner, Paula Dieguez, Karsten Dierks, Ariane Düx, Susann Dupke, Henk Eshuis, Pierre Formenty, Yisa Ginath Yuh, Annemarie Goedmakers, Jan F. Gogarten, Anne-Céline Granjon, Scott McGraw, Roland Grunow, John Hart, Sorrel Jones, Jessica Junker, John Kiang, Kevin Langergraber, Juan Lapuente, Kevin Lee, Siv Aina Leendertz, Floraine Léguillon, Vera Leinert, Therese Löhrich, Sergio Marrocoli, Kerstin Mätz-Rensing, Amelia Meier, Kevin Merkel, Sonja Metzger, Mizuki Murai, Svenja Niedorf, Hélène De Nys, Andreas Sachse, Joost van Schijndel, Ulla Thiesen, Els Ton, Doris Wu, Lothar H. Wieler, Christophe Boesch, Silke R. Klee, Roman M. Wittig, Sébastien Calvignac-Spencer and Fabian H. Leendertz: Persistent anthrax as a major driver of wildlife mortality in a tropical rainforest. Nature 548, 82–86 (03 August 2017)

Quelle: 04560

Robert-Koch-Institut: Untersuchung eines Ausbruchs durch Lebensmittelvergiftung in drei Kindergärten in Berlin. Epidemiologisches Bulletin vom 19. Januar 2009 / Nr. 3

Quelle: 10222

Bundesinstitut für Risikobewertung (BfR), Mikrobielle Risiken von Lebensmitteln - *Bacillus cereus*
http://www.bfr.bund.de/de/bacillus_cereus-54344.html

Quelle: 10223

Public Health Agency of Canada (PHAC), Pathogen Safety Data Sheets - *Bacillus cereus*
<https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/bacillus-cereus.html>

Quelle: 24371

Antonation KS, Grützmacher K, Dupke S, Mabon P, Zimmermann F, Lankester F, Peller T, Feistner A, Todd A, Herbinger I, de Nys HM, Muyembe-Tamfun JJ, Karhemere S, Wittig RM, Couacy-Hymann E, Grunow R, Calvignac-Spencer S, Corbett CR, Klee SR, Leendertz FH. *Bacillus cereus* Biovar Anthracis Causing Anthrax in Sub-Saharan Africa-Chromosomal Monophyly and Broad Geographic Distribution. PLoS Negl Trop Dis. 2016 Sep 8;10(9):e0004923.

Quelle: 24372

Decousser JW, Ramarao N, Duport C, Dorval M, Bourgeois-Nicolaos N, Guinebretière MH, Razafimahefa H, Doucet-Populaire F.: *Bacillus cereus* and severe intestinal infections in preterm neonates: Putative role of pooled breast milk. Am J Infect Control. 2013 Oct;41(10):918-21.

Quelle: 24373

Hoffmaster AR, Ravel J, Rasko DA, Chapman GD, Chute MD, Marston CK, De BK, Sacchi CT, Fitzgerald C, Mayer LW, Maiden MC, Priest FG, Barker M, Jiang L, Cer RZ, Rilstone J, Peterson SN, Weyant RS, Galloway DR, Read TD, Popovic T, Fraser CM.: Identification of anthrax toxin genes in a *Bacillus cereus* associated with an illness resembling inhalation anthrax. Proc Natl Acad Sci U S A. 2004 Jun 1;101(22):8449-54. Epub 2004 May 21.

Quelle: 24374

Lam KC.: Endophthalmitis caused by *Bacillus cereus*: a devastating ophthalmological emergency.

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