

Micrococcus luteus

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GENERAL INFORMATION

Micrococcus luteus

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

Micrococcus luteus is a Gram-positive bacterial species whose strains form coccoid rods, often in pairs. Members of the species thrive under aerobic conditions. Phylogenetically, the genus belongs to the *Actinomycetaceae* family. *M. luteus* has been described as an opportunistic pathogen in humans.

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Category: Bacteria

Strain type: ATCC 4698; BCRC 80739; CCM 169; CCUG 5858; CECT 5053; CGMCC 1.2299; CIP A270; DSM 20030; HAMBI 1399; HAMBI 26; IEGM 391; IFO 3333; JCM 1464; LMG 4050; NBRC 3333; NCCB 78001; NCIB 9278; NCIMB 9278; NCTC 2665; NRRL B-287; VKM B-1314

Note: Strain ATCC 9341 [= DSM 348 = FDA strain PCI 1001 = NCIMB 8553 (formerly NCIB 8553; formerly NCDO 758)], is listed as a strain for quality control in many uses. This strain is also mentioned in official documents and rules. However, this strain does not belong to *M. luteus* but to the genus *Kocuria*, here to the species *Kocuria rhizophila*, which is classified in risk group 1 according to [TRBA 466](#).

Further information:

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

Risk group:

1

Biological agents that are unlikely to cause human disease.

Consultant / Reference laboratory:

The Federal Ministry of Health does not fund a consultant laboratory specialising in actinomycetes or actinobacteria. Consulting services are available at:

Consulting laboratory for anaerobic bacteria:

University Hospital of Leipzig,
Institute of Medical Microbiology and Infection Epidemiology,
Prof. Dr A. C. Rodloff
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Colonies of *Micrococcus luteus* DSM 20230 after cultivation on TSA following 48 h of incubation at 28 °C.

Medical significance

Micrococcus luteus can proliferate under aerobic and conditions and is found in humans as part of their normal bacterial flora, primarily on the skin, but also in the mouth. Infections are frequently endogenous. Although extremely rare, reports of infections in humans have occurred, mainly in immunocompromised patients, leading to abscesses, endocarditis, sepsis and pneumonia.

Reference: [10460](#) [10461](#) [10463](#) [10464](#) [10467](#) [10468](#) [10469](#) [25653](#) [25654](#) [25656](#) [25657](#) [25658](#)

Transmission routes

Transmission occurs via contact with people who possess *M. luteus* as part of their normal flora or via contaminated medical equipment and contaminated blood supplies.

Reference: [10458](#) [10462](#) [10467](#) [10469](#) [25655](#)

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

- Medicine
- Care facilities
- Health services
- Welfare services

Reference: [99999](#)

ACTIVITIES

In particular, healthcare occupations involving close contact with asymptomatic caregivers harbouring *M. luteus* as part of the normal skin flora. Endogenous infections are also possible.

Reference: [10460 25658](#)

PROTECTIVE MEASURES

General protective measures

Medical activities, especially in intensive care and in the treatment of immunosuppressed patients, should be performed wearing appropriate protective clothing, as transmission usually occurs via minor injuries of the skin or mucous membranes.

Note: These measures are primarily intended to protect patients.

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.

For biological agents of the risk group **1** the basic rules of good microbiological practice are to be followed in the intended laboratory operations. For biomaterials exhibiting sensitising or toxic properties, the risk assessment may indicate that additional precautions are necessary.

The doors of the protection level area must be equipped with an inspection window.

Wash basins, disposable towels and hand detergents must be available.

Surfaces (worktops, floors) must be easy to clean and resistant to the materials and detergents used.

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.

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

Organisational measures

Injuries must be reported immediately to the person in charge.

Personal protection - body protection

Lab coats are mandatory.

Used lab coats must be kept separate from normal clothing.

Personal protection - hand protection

Use protective gloves as required.

The skin protection plan must be observed.

Occupational hygiene

The consumption and storage of food and alcohol/tobacco in the protection level area is forbidden. The hands are to be thoroughly cleaned and treated according to the hand protection plan following completion of the activities or contamination processes.

Vaccination

No vaccination is currently planned, and a vaccine is not available.

Reference: 00001 99999

INACTIVATION / DECONTAMINATION

All solid and liquid wastes can be disposed of without pre-treatment if not otherwise stipulated by legal regulations (such as water, waste or genetic engineering legislation).

Reference: 00001

IMMEDIATE MEASURES / FIRST AID / POST-EXPOSURE PROPHYLAXIS

Accidental release measures

Disinfection as per the hygiene plan. Otherwise, no special measures are necessary.

First aid: eyes and mucous membranes

Not required, possibly flush eyes using an eye-wash bottle.

First aid: skin

Skin disinfection in accordance with the hygiene plan.

First aid: respiratory tract

Not necessary.

First aid: swallowing

Not necessary.

Information for physicians

Micrococcus luteus poses no risk when handled hygienically.

Micrococcus luteus infections are often treated with cephalosporins and quinolones, but also with vancomycin and teicoplanin (possibly rifampin). There have been reported cases of pronounced resistance to erythromycin and other antibiotics.

Reference: 25658 99999

OCCUPATIONAL HEALTH CARE according to [ArbMedVV](#)

In the case of activities with the biological agent no health care is required. An indication on restrictions for immunosuppressed workers should be made.

MORPHOLOGY AND PHYSIOLOGY

MORPHOLOGY

Micrococcus luteus is a Gram-positive coccoid short rod, often with coccoid cell shape. The cells often appear in pairs or in "clusters". The bacteria form no spores.

Colonies on nutrient agar substrates are often markedly yellow or orange in colour. Following 24 hours of incubation, they reach a size of 2 - 4 mm.

Reference: 25655

PHYSIOLOGY

Micrococcus luteus grows aerobically and exhibits oxidative metabolism. It can aerobically metabolise a wide variety of carbohydrates. Three biovarieties have been identified, which differ in their metabolic and physiological capabilities. It can be cultivated readily on conventional nutrient-rich media, especially those containing blood, under aerobic conditions at 37 °C. No specific virulence factors have been identified to date.

Reference: [25655](#)

INFORMATION ON MOLECULAR BIOLOGY

Genome

A number of *Micrococcus luteus* strain genomes have now been fully sequenced, including those of 2 strains from blood cultures (NCCP 15887 and NCPP 16831). The genome of the strain NCCP 15687 (2,445,333 nucleotides) is similar in size to that of the strain NCCP 16831 (2,459,530 nucleotides). The genome of NCCP 15687 has been found to contain 2,391 genes, including 2,167 protein-coding genes and 58 RNAs, while that of NCCP 16831 was predicted to contain a total of 2,271 genes, including 2,117 protein-coding genes and 57 RNAs. The data have been recorded under GenBank accession no. CP043849 and SRA accession no. SRR10803019 (PacBio) and SRR10762780 (Ion S5) for NCCP 15687 and under accession no. CP043842 and SRA accession no. SRR10803018 (PacBio) and SRR10762802 (Ion S5) for NCCP 16831. In addition, *M. luteus* strains have been found to contain large linear megaplasmids, including, among others, antibiotic resistance genes.

Comments

Micrococcus luteus was one of the first organisms in which natural transformation in bacteria was elucidated. Strains of this species are studied as model organisms to investigate this type of horizontal gene transfer.

Reference: [10459](#) [10465](#) [10466](#) [10470](#) [25656](#)

OCCURRENCE / NATURAL HABITAT

FREE-LIVING / HOST BOUND

This biological agent is free-living.

This biological agent is host dependent-commensalic.

Micrococcus luteus is found on the skin and mucous membranes of many (even healthy) animals. Transmission can occur from these animals to other animals, or potentially to humans, although the latter has not been definitively documented.

M. luteus has even been proved to be a constituent of the skin or mucous membrane flora of healthy humans. *M. luteus* has also been isolated from environmental samples. Its natural habitat has not been conclusively established.

Reference: [25655](#)

HOSTS

Skin and mucous membranes of humans and many mammals.

Reference: [25655](#)

VECTORS

The organism can be transmitted to humans by close contact with other people as well as by animals. Endogenous infections are also a possibility.

Reference: [10460](#) [25658](#)

GEOGRAPHIC DISTRIBUTION

Worldwide.

Reference: [99999](#)

PATHOGENICITY / PATHOGENIC PROPERTIES

CHARACTERISTIC OF PATHOGENICITY

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

Facultative animal-pathogenic (it does not necessarily cause diseases in animals).

Human infections with *M. luteus* are relatively rare. A variety of infections such as sepsis, pneumonia and endocarditis have been reported, but to date exclusively in immunocompromised patients. The pathogenesis of such cases is influenced by a variety of bacterial and host-dependent factors. Thus far, only a small number of potential virulence or pathogenicity factors have been described, some of which are exoenzymes. Their significance in the broader context of the process of infection remains unclear.

Reference: 10459 10460 10461 10462 10463 10464 10468 10469 25653 25654 25657 25658

MINIMUM INFECTIOUS DOSE (MID)

Not known.

Reference: 99999

CARCINOGENICITY / MUTAGENICITY / REPRODUCTIVE TOXICITY

Not known.

Reference: 99999

ALLERGENICITY / SENSITISING EFFECT

An allergic / sensitising potential is not known.

Reference: 99999

TOXIGENICITY / TOXIN FORMATION

They have been reported to produce cadaverine via marked lysine decarboxylase activity.

Reference: 25655

DISEASE

DESCRIPTION

No specific disease has been described.

Reference: 99999

ZOONOSIS

Zoonosis (transmission between animals and humans): Yes

Transmission from animals to humans is possible. In spite of this, infection with *M. luteus* is not considered a zoonosis.

Reference: 99999

INFECTIOUS STAGES

No specific infectious stages have been described.

Reference: 99999

INCUBATION PERIOD

Unknown.

Reference: [99999](#)

SYMPTOMS AND COURSE OF DISEASE

Varies depending on the type of infection. In general, infections with *M. luteus* are of opportunistic origin, in which various factors play a role, especially the immunological competence of the infected person(s).

Reference: [99999](#)

LETHALITY

Not known.

Reference: [99999](#)

THERAPY

Micrococcus luteus is sensitive to cephalosporins and quinolones, as well as to vancomycin and teicoplanin (possibly rifampin). There have been reported cases of pronounced resistance to erythromycin and other antibiotics.

Reference: [25658](#)

PROPHYLAXIS

No vaccination is available.

Reference: [99999](#)

EPIDEMIOLOGY

TRANSMISSION ROUTES / PORTALS OF ENTRY

Transmission takes place percutaneously (through the skin).

Micrococcus luteus is found in humans as part of their normal bacterial flora, primarily on the skin but also in the mouth. Infections are, hence, frequently endogenous. Transmission from animals is also a possibility, as is contaminated medical equipment.

Reference: [25655](#) [25658](#)

PATHOGEN RESERVOIR

Humans and animals (often asymptomatic). *M. luteus* can also be isolated from the environment.

Reference: [25655](#) [25658](#)

INCIDENCE

Not known.

Reference: [99999](#)

RESISTANCE / TENACITY

SPORULATION

Does not form spores.

Reference: [99999](#)

CONIDIA FORMATION

Does not form conidia.

Reference: [99999](#)

RESISTANCES

The organism has been reported to be resistant to erythromycin and other antibiotics.

Reference: [25658](#)

LEGAL PRINCIPLES / REGULATIONS

LAWS AND ORDINANCES

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

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

TECHNICAL RULES AND OTHER REGULATIONS

[TRBA 100](#)

Protective measures for activities involving biological agents in laboratories

[TRBA 230](#)

Protective measures for activities involving biological agents in agriculture and forestry and comparable activities

[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 for this pathogen](#)

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: 10458

Dargère S, Cormier H, Verdon R. Contaminants in blood cultures: importance, implications,
interpretation and prevention. Clin Microbiol Infect. 2018 Sep; 24(9):964–969.

<https://doi.org/10.1016/j.cmi.2018.03.030>

Quelle: 10459

Dib JR, Wagenknecht M, Hill RT, Farías ME, Meinhardt F. First report of linear megaplasmids in the
genus *Micrococcus*. Plasmid. 2010 Jan; 63(1):40-45.

<https://doi.org/10.1016/j.plasmid.2009.10.001>

Quelle: 10460

Erbasan F. Brain abscess caused by *Micrococcus luteus* in a patient with systemic lupus
erythematosus: case-based review. RheumatolInt. 2018 Dec; 38(12):2323–2328.

<https://doi.org/10.1007/s00296-018-4182-2>

Quelle: 10461

Fosse T, Toga B, Peloux Y, Granthil C, Bertrando J, Sethian M. Meningitis due to *Micrococcus luteus*.
Infection. 1985 Nov; 13(6): 280–281.

<https://doi.org/10.1007/BF01645439>

Quelle: 10462

Hirata Y, Sata M, Makiuchi Y, Morikane K, Wada A, Okabe N, Tomoike H. Comparative analysis of
Micrococcus luteus isolates from blood cultures of patients with pulmonary hypertension receiving
epoprostenol continuous infusion. J Infect Chemother. 2009; 15(6):424–425.

<https://doi.org/10.1007/s10156-009-0720-X>

Quelle: 10463

Ianniello NM, Andrade DC, Ivancic S, Eckardt PA, Lemos Ramirez JC. Native valve infective
endocarditis due to *Micrococcus luteus* in a non-Hodgkin's lymphoma patient. IDCases. 2019; 18:

e00657. <https://doi.org/10.1016/j.idcr.2019.e00657>

Quelle: 10464

Khan A, Aung TT, Chaudhuri D. The first case of native mitral valve endocarditis due to *Micrococcus*
luteus and review of the literature. Case Rep Cardiol. 2019 Dec 04;2019:1–3.

<https://doi.org/10.1155/2019/5907319>

Quelle: 10465

Kuo V, Shoemaker WR, Muscarella ME, Lennon JT. Whole-genome sequence of the soil bacterium
Micrococcus sp. KBS0714. Genome Announc 2017, 5:e00697-17.

<https://doi.org/10.1128/genomeA.00697-17>.

Quelle: 10466

Liebl W, Kloos WE, Ludwig W. Plasmid-borne macrolide resistance in *Micrococcus luteus*. *Microbiology*. 2002 Aug 01;148(8):2479–2487.
<https://doi.org/10.1099/00221287-148-8-2479>

Quelle: 10467

Magee JT, Burnett IA, Hindmarch JM, Spencer RC. *Micrococcus* and *Stomatococcus* spp. from human infections. *J Hosp Infect* 1990 16:67–73.
[https://doi.org/10.1016/0195-6701\(90\)90050-x](https://doi.org/10.1016/0195-6701(90)90050-x).

Quelle: 10468

Miltiados G, Elisaf M. Native valve endocarditis due to *Micrococcus luteus*: a case report and review of the literature. *J Med Case Reports*. 2011 Dec;5(1):251.
<https://doi.org/10.1186/1752-1947-5-251>

Quelle: 10469

Peces R, Gago E, Tejada F, Lares AS, Alvarez-Grande J. Relapsing bacteraemia due to *Micrococcus luteus* in a haemodialysis patient with a Perm-Cath catheter. *Nephrol Dial Transplant*. 1997 Nov 1; 12(11):2428–2429. <https://doi.org/10.1093/ndt/12.11.2428>

Quelle: 10470

Young M, Artsatbanov V, Beller HR, Chandra G, Chater KF, Dover LG, Goh E-B, Kahan T, Kaprelyants AS, Kyrpides N, Lapidus A, Lowry SR, Lykidis A, Mahillon J, Markowitz V, Mavromatis K, Mukamolova GV, Oren A, Rokem JS, Smith MC, Young DI, Greenblatt CL. Genome sequence of the Fleming strain of *Micrococcus luteus*, a simple free-living actinobacterium. *J Bacteriol* 2010, 192:841– 860.
<https://doi.org/10.1128/JB.01254-09>.

Quelle: 25653

Andreopoulos T, Papanikolaou G, Politou M, Konstantopoulos K, Stefanou J, Loukopoulos D. *Micrococcus luteus*: a putative cause of hepatic abscess? *Panminerva Med*. 2000 Sep;42(3):231–232.

Quelle: 25654

Buonsenso D, Lombardo A, Fregola A, Ferrari V, Piastra M, Calvani M, Lazzareschi I, Valentini P. First Report of *Micrococcus luteus* Native Valve Endocarditis Complicated With Pulmonary Infarction in a Pediatric Patient: Case Report and Literature Review. *Pediatr Infect Dis J*. 2021 Jul 1;40(7):e284-e286. doi: 10.1097/INF.0000000000003133.

Quelle: 25655

Busse, H.-J. *Micrococcus* Cohn 1872, 151AL emend. Stackebrandt, Koch, Gvozdiak, Schumann 1995, 682 emend. Wieser, Denner, Kämpfer, Schumann, Tindall, Steiner, Vybiral, Lubitz, Maszenan, Patel, Seviour, Radax and Busse 2002, 635. In: *The Actinobacteria* (Edited by M. Goodfellow, P. Kämpfer, H.-J. Busse, M.E. Trujillo, K.I. Suzuki, W. Ludwig and W.B. Whitman) *Bergey's Manual of Systematics of Archaea and Bacteria*, Online 2015 *Bergey's Manual Trust*. DOI: 10.1002/9781118960608.gbm00121. Published by John Wiley & Sons, Inc., in association with *Bergey's Manual Trust*.

Quelle: 25656

Torasso Kasem EJ, Angelov A, Werner E, Lichev A, Vanderhaeghen S, Liebl W. Identification of New Chromosomal Loci Involved in com Genes Expression and Natural Transformation in the Actinobacterial Model Organism *Micrococcus luteus*. *Genes (Basel)*. 2021 Aug 25;12(9):1307. doi: 10.3390/genes12091307. PMID: 34573289

Quelle: 25657

Wharton M, Rice JR, McCallum R, Gallis HA. Septic arthritis due to *Micrococcus luteus*. *J Rheumatol*. 1986 Jun;13(3):659–660.

Quelle: 25658

Zhu M, Zhu Q, Yang Z, Liang Z. Clinical Characteristics of Patients with *Micrococcus luteus* Bloodstream Infection in a Chinese Tertiary-Care Hospital. *Pol J Microbiol*. 2021 Sep;70(3):321-326. doi: 10.33073/pjm-2021-030. Epub 2021 Sep 17. PMID: 34584526

Quelle: 25664

Tang JS, Gillevet PM: Reclassification of ATCC 9341 from *Micrococcus luteus* to *Kocuria rhizophila*.

Int J Syst Evol Microbiol. 2003 Jul;53(Pt 4):995-997.

Quelle: 99999

Angabe des Bearbeiters

Indication of the author

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