



HAL
open science

Scedosporium apiospermum

Jean-Philippe Bouchara, Nicolas Papon

► **To cite this version:**

Jean-Philippe Bouchara, Nicolas Papon. *Scedosporium apiospermum*. *Trends in Microbiology*, 2019, 27 (12), pp.1045-1046. 10.1016/j.tim.2019.07.003 . hal-02483077

HAL Id: hal-02483077

<https://univ-angers.hal.science/hal-02483077>

Submitted on 21 Dec 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Scedosporium apiospermum

Jean-Philippe Bouchara^{1,*} and Nicolas Papon¹

¹ Groupe d'Etude des Interactions Hôte-Pathogène (GEIHP, EA 3142), SFR ICAT 4208, UNIV Angers, UNIV Brest, Angers, France.

* Correspondence: Jean-Philippe.Bouchara@univ-angers.fr (J.-P. Bouchara).

Keywords: Cystic fibrosis; Chronic colonization; Host immune defense evasion; Adaptation

Usually a soil saprophyte, *Scedosporium apiospermum* is one of the major pathogenic *Scedosporium* species. Beside chronic localized infections resulting from traumatic inoculation of some soil fungal elements, this cosmopolitan filamentous fungus may also cause respiratory or disseminated infections through inhalation of conidia, particularly in patients with hematological malignancies, solid organ transplant recipients, and patients with cystic fibrosis (CF). With a frequency ranging from 3.5 to 11.7%, *Scedosporium* species rank second among the filamentous fungi chronically colonizing CF airways. Although well tolerated in most cases, this airway colonization may lead to bronchitis or allergic broncho-pulmonary mycoses, but also to disseminated infections in patients undergoing lung or heart-lung transplantation. Here we summarize the recent advances on the mechanisms allowing the fungus to evade host immune defenses and to establish a chronic respiratory infection.

KEY FACTS:

A soil fungus that assimilates numerous aromatic or polycyclic hydrocarbons.

A worldwide distribution, but mainly found in human-impacted areas such as industrial areas, city parks, roadsides, and farming lands.

Highly semi-selective culture media are available for detection of *Scedosporium* species.

First genome sequence of *S. apiospermum* (43.4 Mbp; 10,919 predicted genes) published in 2014.

DISEASE FACTS:

S. apiospermum may cause various human infections ranging from localized infections such as subcutaneous and bone or joint infections, to severe and often fatal disseminated infections in immunocompromised hosts.

This old pathogen has recently gained increasing attention, because of its worldwide recognition as a significant pathogen in CF.

Colonization of CF airways constitutes a major risk factor for a disseminated infection in the case of lung transplantation and all efforts should be made to detect the airway colonization as early as possible and to eradicate the fungus, particularly at registration on the transplantation waiting list.

The limited susceptibility of this fungus to current antifungals justifies work aiming to elucidate its biology and pathogenic mechanisms, which has already led to the identification of some promising targets for drug development, e.g., enzymes involved in uridine synthesis, acylation of inositol, nonribosomal peptide (NRP) synthesis or detoxification of reactive oxygen species.

TAXONOMY AND CLASSIFICATION:

KINGDOM: Fungi

PHYLUM: Ascomycota

CLASS: Sordariomycetes

ORDER: Microascales

FAMILY: Microascaceae

GENUS: *Scedosporium*

SPECIES: *apiospermum*

LITERATURE

1. Hedayati, M.T. *et al.* (2019) Fungal epidemiology in cystic fibrosis patients with a special focus on *Scedosporium* species complex. *Microb. Pathog.* 129, 168-175
2. Le Govic, Y. *et al.* (2018) Genomic organization and expression of iron metabolism genes in the emerging pathogenic mold *Scedosporium apiospermum*. *Front. Microbiol.* 9, 827
3. Morales, T. *et al.* (2017) The genomic study of an environmental isolate of *Scedosporium apiospermum* shows its metabolic potential to degrade hydrocarbons. *Stand. Genomic Sci.* 12, 71
4. Ramirez-Garcia, A. *et al.* (2018) *Scedosporium* and *Lomentospora*: an updated overview of underrated opportunists. *Med. Mycol.* 56(suppl_1), 102-125
5. Rougeron, A. *et al.* (2018) Ecology of *Scedosporium* species: present knowledge and future research. *Mycopathologia* 183, 185-200
6. Schwarz, C. *et al.* (2018) Developing collaborative works for faster progress on fungal respiratory infections in cystic fibrosis. *Med. Mycol.* 56(suppl_1), 42-59
7. Seidel, D. *et al.* (2019) Prognostic factors in 264 adults with invasive *Scedosporium* spp. and *Lomentospora prolificans* infection reported in the literature and FungiScope®. *Crit. Rev. Microbiol.* Jan 10, 1-21

Trends in Microbiology | Microbe of the Month

8. Staerck, C. *et al.* (2019) Transcriptional profiling of *Scedosporium apiospermum* enzymatic antioxidant gene battery unravels the involvement of thioredoxin reductases against chemical and phagocytic cells oxidative stress. *Med. Mycol.* 57, 363-373
9. Vandeputte, P. *et al.* (2014) Draft genome sequence of the pathogenic fungus *Scedosporium apiospermum*. *Genome Announc.* 2(5). pii: e00988-14
10. Wiederhold, N.P. (2018) The antifungal arsenal: alternative drugs and future targets. *Int. J. Antimicrob. Agents.* 51, 333-339

Scedosporium apiospermum

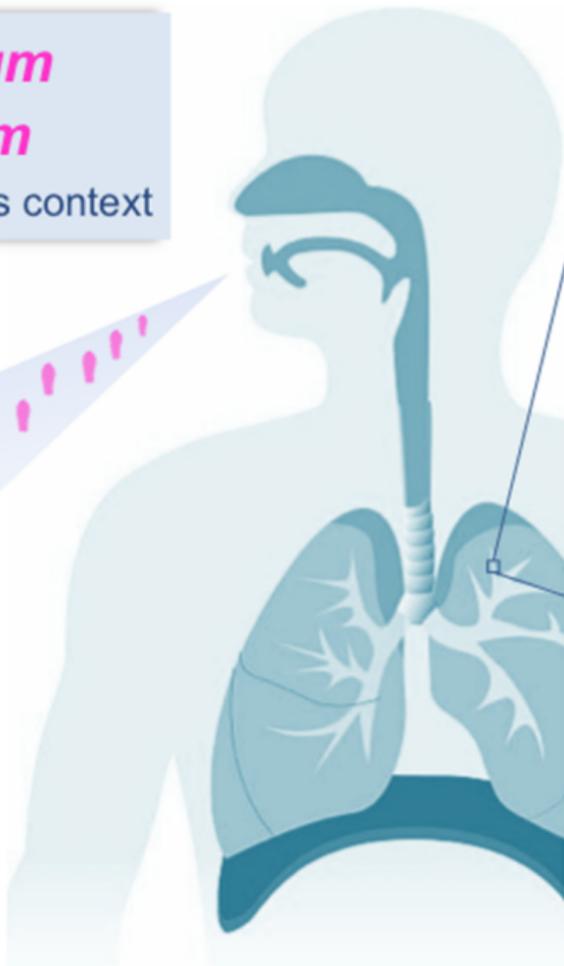
in the cystic fibrosis context

Spore inhalation



Sources:

- Industrial areas
- City parks
- Roadsides
- Farming lands



Entrapment
(sticky mucus)
and germination

Adaptation to:

- Hypercapnia
- Hypoxia
- Low osmotic pressure
- Acid pH
- Elevated lactate



Spore evasion to the host immune defenses

- Dihydroxynaphthalene-melanin
- Degradation of reactive oxygen species (glycosyl phosphatidyl inositol-anchored enzymes)

Spore germination inducing

- Biofilm formation
- NRP synthesis
- Polyketide synthesis

