



0709-3 *Fusarium* species

HISTORY This sample was sent as nail isolate.

CMPT QA: Pure growth of 4+ *Fusarium* species viable for 36 days.

Reference Laboratory: Growth of *Fusarium* species.

Results received and media and methods noted are listed in Table 1. There were no misidentifications as in a previous challenge with this fungus, 0305-3 skin scraping, when all laboratories (n=9) also identified *Fusarium* species.

IDENTIFICATION There are about 100 species of *Fusarium*¹ and speciation may be difficult due to the variability between isolates (e.g., in shape and size of conidia and colony color) and because features that are required are not always well developed (e.g., the absence of macroconidia in some isolates after subculture). Sporulation may need to be induced in some isolates and a good slide culture is essential. Nucleic acid detection techniques appear to be useful for the detection and identification of *Fusarium* strains to species level; however, only a limited number of studies have been published¹.

Colony morphology¹⁻⁴ *Fusarium* colonies are usually fast growing on Sabouraud dextrose agar at 25°C maturing within 4 days to pale or brightly colored (depending on the species) and may be felty, cottony or wooly or sparse and wet-looking. The only slow-growing species is *Fusarium dimerum*. The color of the thallus varies from whitish to yellow, brownish, pink, reddish or lilac or blue to blue-green shades. *Fusarium* may be any colour except olivaceous black or black. A sclerotium, which is the organized mass of hyphae that remains dormant during unfavorable conditions, may be observed macroscopically and is usually dark blue in color. On the other hand, sporodochium, the cushion-like mat of hyphae bearing conidiophores over its surface, is usually absent in culture. When present, it may be observed in cream to tan or orange color, except for *Fusarium solani*, which gives rise to blue-green or blue sporodochia⁴.

Microscopic morphology² Hyaline septate hyphae, conidiophores, phialides, macroconidia, and microconidia are observed microscopically. *Fusarium* have septate hyphae with two types of conidiation: unbranched or branched conidiophores with phialides that produce large (2-6 x 14-80 µm) sickle- or canoe-shaped macroconidia, and long or short simple conidiophores bearing small (2-4 x 4-8 µm) oval, 1 or 2 celled conidia singly or in clusters. Chlamydospores are sparse, in pairs, clumps or chains, thick-walled, hyaline, intercalary or terminal and are produced by *Fusarium chlamy-*

dosporum, *Fusarium napiforme*, *Fusarium oxysporum*, *Fusarium semitectum*, *Fusarium solani*, and *Fusarium sporotrichoides*³.

CLINICAL SIGNIFICANCE There are about 100 species of *Fusarium*¹ most of which are soil fungi and they have a world-wide distribution. They are common plant pathogens⁵ and can be encountered as laboratory contaminants. *Fusarium* spp. are also causative agents of superficial and systemic infections in humans collectively referred to as fusariosis. Several species, notably *F. oxysporum*, *F. solani*⁴ and *F. moniliforme*, are recognized as being pathogenic to man and animals causing mycotic keratitis, onychomycosis and hyalohyphomycosis*, especially in burn victims and bone marrow transplant patients. Trauma is the major predisposing factor for development of cutaneous and subcutaneous infections, endophthalmitis, osteomyelitis, and arthritis due to *Fusarium* strains. Disseminated opportunistic infections develop in immunosuppressed hosts⁶, especially in neutropenic and transplant patients. Peritonitis has also been reported in patients on continuous ambulatory peritoneal dialysis (CAPD). The typical patient is granulocytopenic and receiving broad-spectrum antibiotics for unexplained fever.

The presence of hyaline, branching septate hyphae, similar to *Aspergillus* in any specimen, from a patient with supporting clinical symptoms should be considered significant³. Disseminated infections are similar to disseminated aspergillosis; however, *Fusarium* fungemia and ulcerated skin lesions are often more pronounced. Biopsy and evidence of tissue invasion is of particular importance.

Clusters of *Fusarium* keratitis were reported among contact lens users in Singapore and Hong Kong beginning in February 2006⁷. By May 2006 the CDC reported 58 confirmed cases of *Fusarium* keratitis from multiple states in the USA; 56 out of these 58 patients reported using contact lenses. In an additional 8 cases reported from San Francisco none of the patients had clinical features that led the examining ophthalmologist to suspect the diagnosis of filamentous fungal keratitis⁸. This case series also emphasizes the importance of corneal cultures in assisting with early diagnosis of microbial keratitis and the poor outcome of *Fusarium* keratitis when prolonged corticosteroid treatment is administered and appropriate antifungal treatment is delayed.

Outbreaks of nosocomial fusariosis have also been reported¹. Existence of *Fusarium* in hospital water distri-

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Table 1. 0709-3 Identification results received and media and methods noted.		
Identification	No. of labs	Media & ID Methods
<i>Fusarium</i> species	8	SAB, BAP, PDA, DTM, 30°C; IMA, 30°C; IMA, 30°C; IMA, Mycosel, 30°C; IMA, 25°C, 37°C; BHIA w/ antibiotics, 25°C; Littman oxgall, Mycosel, 25°C; IMA, Mycobiotic agar, SAB, 25°C; IMA, Mycosel, 29°C
Total	8	

Key: SAB - Sabouraud dextrose agar; PDA - potato dextrose agar; IMA - inhibitory mould agar; DTM - dermatophyte test medium; BHIA - Brain Heart Infusion Agar

bution systems may result in disseminated fusariosis in immunosuppressed patients. *Fusarium* may also exist in soil of potted plants in hospitals. These plants constitute a hazardous mycotic reservoir for nosocomial fusariosis.

Fusarium spp. produce [mycotoxins](#)¹. Ingestion of grains contaminated with these toxins may give rise to allergic symptoms or be carcinogenic in long-term consumption. Fumonisin are the mycotoxins produced by *Fusarium moniliforme* and *Fusarium proliferatum* in maize. They may cause oesophageal cancer. Another group of mycotoxins, zearalenones, may also be produced by some *Fusarium* spp. growing in grains. Studies on reduction or elimination of *Fusarium* mycotoxins from contaminated agricultural and food commodities are in progress.

TREATMENT Prompt therapy options for disseminated fusariosis include the lipid formulations of amphotericin B, voriconazole, and posaconazole⁶.

REFERENCES

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***Hyalohyphomycosis** is a general term used to group together infections caused by unusual hyaline fungal pathogens that are not agents of otherwise-named infections such as Aspergillosis. Etiological agents include species of *Fusarium*, *Penicillium*, *Paecilomyces*, *Acremonium*, *Beauveria*, and *Scopulariopsis*. Hyalohyphomycosis of man or animals is caused by a number of hyaline (non-dematiaceous) hyphomycetes where the tissue morphology of the causative organism is mycelial. This separates it from phaeohyphomycosis where the causative agents are brown-pigmented fungi. The clinical manifestations of hyalohyphomycosis are many ranging from harmless saprophytic colonization to acute invasive disease.