

0809-2 *Microsporium cookei*

HISTORY This sample was sent as a toe nail isolate.

CMPT QA Pure growth of *Microsporium cookei* viable 37 days.

REFERENCE LABORATORY Reported pure growth of *Microsporium cookei*.

Results are shown in Table 1. One participant reported possible *T. mentagrophytes* or *T. ajelloi* (*Keratinomyces ajelloi*). Controversy surrounding the name *Keratinomyces ajelloi* exists (see Note⁶).

Table 1. 0809-2 Identifications received for <i>Microsporium cookei</i> .		
Report received	No.	Media
<i>Microsporium cookei</i>	1	PDA, FSA/25°C
<i>Microsporium</i> species	1	PDA, DTM, FSA/33°C, urea
<i>Microsporium</i> species or <i>Trichophyton mentagrophytes</i>	1	FSA/RT
possible <i>T. mentagrophytes</i> or <i>T. ajelloi</i> (<i>Keratinomyces ajelloi</i>)	1	FSA/RT /
no report	1	/
Media key: PDA - potato dextrose agar; FSA - fungus selection agar; DTM - dermatophyte test medium		

IDENTIFICATION ¹⁻⁴*Microsporium* differs from *Trichophyton* and *Epidermophyton* by having spindle-shaped macroconidia with echinulate to rough walls. A combination of characters (macroscopic and/or microscopic) from each medium is required for identification and no one single test is infallible. The five important colony characteristics to look for in presumptive identification of a dermatophyte culture when it is one to three weeks old are: (1) rate of growth; (2) general topography (flat, heaped, regularly or irregularly folded); (3) texture (yeast-like, glabrous, powdery, granular, velvety or cottony); (4) surface pigmentation; and (5) reverse pigmentation.

Microscopic morphology *M. cookei* produces septate branching hyphae, numerous macroconidia and microconidia. Microconidia are unicellular and ovoid to pyriform in shape. Occasional spirals may be seen. The macroconidia are numerous, oval (10-15 x 30-50 µm) in shape, very thick-walled, rough with 5- to 8-cells. The thick-walled macroconidia are quite characteristic and diagnostic of *M. cookei* and further tests may not be necessary. See image at this URL: <http://microbiology.mtsinai.on.ca/mig/dsma/dsmafig009.shtml> The thick walls and usually larger size of the macroconidia distinguished *M. cookei* from *M. gypseum*. *T. mentagrophytes* produces many round or drop shaped microconidia; macroconidia are uncommon. *T. ajelloi* produces smooth thick walled, cylindrical macroconidia (If possible, compare photographs of *T. ajelloi* [p.1887] with *M. cookei* [p. 1890] shown in *Manual of Clinical Microbiology*, 9th ed. ⁷).

Colony morphology ¹⁻⁴ The growth rate of *Microsporium cookei* is moderately rapid ⁴. The diameter of the colony reaches 1 to 3 cm following incubation at 25°C for 7 days on Sabouraud dextrose agar. The texture is coarse, downy to powdery. The front color is initially white to yellow or dark tannish central areas surrounded by thin, downy, white peripheral zone. Under the aerial mycelium is a distinctive grape red or dark reddish brown pigment. *M. cookei* reverse is dark purplish red to dark brown. *T. mentagrophytes* may produce a pale to red-brown reverse and *T. ajelloi* produces a pale, brownish or purple-black pigment ⁷.

Key Features: Distinctive thick-walled macroconidia and the dark red pigment of *Microsporium cookei* differentiate it from *Microsporium gypseum*.

Vitamin Free Agar (Trichophyton Agar No.1): Good growth indicating no special nutritional requirements, pinkish-buff-coloured, suede-like colony with a deep magenta red reverse.

Hair Perforation Test: *M. cookei* is positive. It is not known to infect hair in vivo ⁴. *E. floccosum* is negative for hair perforation.

CLINICAL SIGNIFICANCE *Microsporium cookei* is a geophilic fungus often isolated from soil and from hair of small mammals showing no clinical lesions. Infection has been reported in rodents, dogs and rarely in humans. It is not known to invade hair in vivo, but produces hair perforations in vitro. *M. cookei* has a world-wide distribution.

T. ajelloi is also a geophilic dermatophyte that is commonly found in colder climates but is sporadic in hot climates, possibly because higher temperatures inhibit its growth. The fungus has been found to be more often associated with acid soils than with alkaline soils ⁶.

TREATMENT In a 2001 study ⁵, the MICs of 508 strains of dermatophytes belonging to 24 species were determined. The majority of strains were clinical isolates from different hospitals in Spain and the United Kingdom. Interestingly, for *M. racemosum* and *M. cookei*, species characterized by conidia with quite thick walls, the mean MICs of some antifungals were higher than those for the rest of species.

Ketoconazole, clotrimazole, itraconazole, terbinafine, naftifine, and amorolfine are in general active in vitro against *M. cookei*. Terbinafine and itraconazole are now commonly used in treatment of infections due to dermatophytes.

REFERENCES

1. <http://www.doctorfungus.org/thefungi/>

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- [microsporum_cookei.htm](#)
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 5. Fernández-Torres B, et al. 2001. In vitro activities of 10 antifungal drugs against 508 dermatophyte strains. *Antimicrob Ag Chemo*.45:9. p. 2524-2528.
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NOTE⁶: One particularly controversial genus is *Keratinomyces*. This genus, with its species *K. ajelloi*, was established but was modified to *T. ajelloi* due to the earlier inadequate treatment of the genus by not providing essential facts that differentiate *Keratinomyces* from the genus *Trichophyton*. An important reason for the transfer was the observation that *K. ajelloi* apparently produces microconidia. The transfer was further supported by the fact that *K. ajelloi* produced cleistothecia of the genus *Arthroderma* in which the sexual states of *Trichophyton* were classified. However, antigenic studies have shown that *T. ajelloi* has little similarity to *Trichophyton* species, emphasizing the need to retain its original designation. Additionally *K. ajelloi* has thick smooth cell walls while *Trichophyton* species have thin walls.