



0609-4 *Trichophyton rubrum*

HISTORY This sample was sent as a nail isolate.

CMPT QA Pure growth of *Trichophyton rubrum*.

REFERENCE LABORATORY Reported pure growth of *Trichophyton rubrum*.

As shown in Table 1, all participants reported growth and correctly identified the isolate as belonging to the genus *Trichophyton*. This isolate was sent to Mycology Plus participants July 2005 (0504-2) and most recently January 2006 (0601-2). The January isolate was not viable and this sample was its replacement. The critique that follows is the same information as given in 0601-2, with the addition of reference 7.

Report received	No. of labs
<i>Trichophyton rubrum</i>	9
<i>Trichophyton raubitschekii</i> (see Clinical Significance)	1
<i>Trichophyton</i> sp.	1

SPECIMEN COLLECTION AND LABORATORY PROCESSING

Please refer to CMPT critique 0509-2 and reference 1.

IDENTIFICATION ^{1,2,3} *Trichophyton* differs from *Microsporum* and *Epidermophyton* by having cylindrical, clavate to cigar-shaped, thin-walled or thick-walled, smooth macroconidia. A combination of macroscopic and/or microscopic characteristics from each medium is required for identification and no one single test is infallible. *T. rubrum* is an exceptionally variable organism and many characteristics either overlap or are inconsistent ⁴.

Microscopic morphology The **downy type** is characterized by the production of scanty to moderate numbers of slender clavate microconidia and no macroconidia. The **granular type** is characterized by the production of moderate to abundant numbers of clavate to pyriform microconidia and moderate to abundant numbers of thin-walled, cigar-shaped macroconidia. Microconidia are characteristically tear-shaped and form singly all along the sides of the hyphae and/or form directly on the macroconidia. Macroconidia usually contain 4 to 10 cells and are long, narrow, thin walled, cigar-or pencil-shaped with parallel sides and either form directly on ends of thick hyphae singly or in groups ⁵. The macroconidia may or may not have terminal appendages. Some species may be sterile and the use of specific media is required to induce sporulation.

Colony morphology Growth of *T. rubrum* is slow to moderately slow maturing in 14 days ^{5,6}. The surface is granular or downy/fluffy coloured white to buff. Reverse colony ranges in colour from deep red or purple to brown, yellow-orange and colourless. The red pigment production is best seen on potato dextrose agar or cornmeal dextrose agar ⁵.

Tests ⁶ Growth of *T. rubrum* on BCP (bromcresol purple agar) is restricted, with no change in pH; urea hydrolysis (urease is negative), hair perforation is negative, and vitamin growth factor tests are negative. *T. tonsurans* and *T. mentagrophytes* are urease positive.

CLINICAL SIGNIFICANCE Members of the genus *Trichophyton* possesses several virulence factors including acid proteinases, elastase, keratinases, and other proteinases that allow them to invade the keratinous tissues of humans and animals ^{1,2}. *Trichophyton rubrum* can remain viable in the environment for over six months ³. *T. rubrum* is an anthropophilic dermatophyte, meaning it is almost exclusively infects humans. It is the most common causative agent of dermatophytoses worldwide. Infections are more common in adult males than in children and women ³. In 1998, a *T. rubrum* infection suggestive of cutaneous blastomycosis was reported in an immunocompromised patient ^{1,7}.

Many strains and varieties of *T. rubrum* have been described, but for practical purposes two types may be distinguished: *T. rubrum* downy type and *T. rubrum* granular type ^{1,4}. The downy strain has become the most widely distributed dermatophyte of man. It frequently causes chronic infections of skin, nails and rarely scalp. The granular strain (Afro-Asiatic *T. raubitschekii*) is a frequent cause of tinea corporis in South East Asia and in Aborigines living in the Northern Territory of Australia ⁴. However, since the Vietnam War, it spread throughout the world, especially to those countries with returning troops or to those receiving refugees, and it has often been described as a new species ⁴. The granular strain represents the parent strain of the downy type; the later evolved by establishing a niche in feet (tinea pedis) when the former was imported into Europe around the turn of the 20th century. It should be stressed that intermediate strains between the two types do occur and that many culture and morphological characteristics overlap ⁴.

TREATMENT Ketoconazole, clotrimazole, itraconazole, terbinafine, naftifine, and amorolfine are in general active in vitro against *Trichophyton*. Terbinafine usually appears to be the most effective agent. In general, isolates of *Trichophyton rubrum* are more susceptible to antifungal agents compared to *Trichophyton mentagrophytes*. The azole derivatives, Syn2869, Syn2836, Syn2903, and Syn2921 are also active in vitro against *Trichophyton* ².

Griseofulvin, once the drug of choice for treatment of dermatophytosis, is now used less due to the availability of more effective and less toxic drugs. Terbinafine and itraconazole are now commonly used in treatment of infections due to *Trichophyton* spp. and other dermatophytes. For treatment of tinea capitis and onychomycosis, oral therapy is usually preferred ².

REFERENCES

1. - 6. See CMPT Critique 0601-2, *Trichophyton rubrum*. January 2006.
http://www.interchg.ubc.ca/cmpt/pdf_mycology/0601_2_trubrum.pdf
7. Squeo RF, Beer R, Silvers D, et al. 1998. Invasive *Trichophyton rubrum* resembling blastomycosis infection in the immunocompromised host. J Am Acad Dermatol. 39:379-80.

Additional reading:

- CMPT Critique 0504-1, *Trichophyton rubrum*. July 2005.
CMPT critique 0509-2 (simulated skin scraping): *M. gypseum*
http://www.interchg.ubc.ca/cmpt/pdf_mycology/0509_2_m_gyp.pdf