

January 2006

0601-2— culture not viable

(intended challenge: *Trichophyton rubrum*)

HISTORY: This was a simulated skin scraping sample.

CMPT QA: indicated there was growth on the day of shipment, but after that the cultures were not viable.

REFERENCE LABORATORY *Trichophyton rubrum*

As shown in Table 1 all participants reported no growth.

Table 1. Results received for 0601-2.	
Identification	No. of labs
Hyphal or fungal elements seen, no fungal growth	7
small colonies isolated, too small to process	1
No fungal growth (with or without after 3, 4 weeks, on primary culture)	2
Grand Total	10

It was disappointing that this organism did not remain viable. Preliminary investigation does not readily reveal why this dermatophyte failed to grow. It grew in all pre send-out studies in approximately 3 days and growth was confirmed by the reference laboratory. Previously, it was used as a Basic Dermatophyte Program identification challenge in survey 0504-1 (results were posted July 2005); 7 out of 8 laboratories reported growth and correctly identified the presence of a dermatophyte, although there was variation at the identification of species, which included: *T. rubrum* [n=3], *T. tonsurans* [n=2], and *T. mentagrophytes* [n=1]. A replacement sample will be sent later in the year.

CLINICAL SIGNIFICANCE Members of the genus *Trichophyton* possess 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 months³. *T. rubrum* is an anthropophilic dermatophyte, meaning it is almost exclusively infects humans. Infections are more common in adults and in males than in children and women³. In 1998, a *T. rubrum* infection suggestive of cutaneous blastomycosis was reported in an immunocompromised patient¹.

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 Australia⁴. 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 species⁴.

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 overlap⁴.

SPECIMEN COLLECTION AND LABORATORY PROCESSING Please refer to CMPT critique 0502-2 and reference 1.

IDENTIFICATION *Trichophyton* differs from *Microsporum* and *Epidermophyton* by having cylindrical, clavate to cigar-shaped, thin-walled or thick-walled, smooth macroconidia.

A combination of characters (macroscopic and/or microscopic) 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 inconsistent⁴.

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 groups⁵. 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 agar⁵.

Tests⁶ Growth of *T. rubrum* on BCP (bromocresol 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.

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 less commonly used 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 preferred².

REFERENCES

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CMPT Critique 0504-1, posted July 2005.