

Origin of the Names of Species of *Candida*

Simi Vincent, M.D., Ph.D.

The selected name of a microorganism is binomial, comprised of the generic name followed by a species name that is subject to the International Code of Botanical Nomenclature (ICBN) (1,2). The names are derived from Latin or Greek. They are descriptive of the fungus, the source of its isolation, or the name of a person. Name changes usually result from differences in taxonomic opinions and are often confusing and controversial.

Yeasts and yeastlike organisms are the most common fungi isolated in clinical laboratories (3). They are considered opportunistic pathogens. The name **Yeast** is derived from words that mean foam and rise. Hence yeasts are often thought of as fermentative Ascomycetes. Some yeasts are Basidiomycetes with a vegetative state and predominantly reproduce by budding or fission. The ability to produce pseudohyphae, true hyphae and/or terminal chlamydo spores, the shape and arrangement of the blastoconidia and other morphologic characteristics as well as biochemical tests are used to identify yeasts at their genus and species level (2).

The genus *Candida* contains heterogeneous anamorphic yeasts and comprises about 196-200 species (1,4) that are physiologically related to ascomycetes or basidiomycetes. The name is derived from the custom in ancient Rome for a *candidatus*, a candidate for public office, to dress in white. *Albico* means "to be white," so the name *Candida albicans* is redundant. The more important pathogenic species, *Candida albicans*, *C. tropicalis*, *C. parapsilosis*, *C. krusei*, *C. lusitaniae* and *C. glabrata*, are phylogenetically related to the Ascomycetes. The genus *Candida* is classified as follows:

Phylum: Deuteromycota

Class: Blastomycetes

Order: Cryptococcales

Family: Cryptococcaceae

Genus: *Candida*

Candida albicans (Robin) Berkhout, 1923:

100 synonyms have been applied to *Candida albicans*. It first was called *Oidium albicans* by Charles-Philippe Robin (1821-1885) in 1853 (1). After further studies, Zopf in 1890 changed its name to *Monilia albicans*. The currently accepted name, *C. albicans*, was introduced by Berkhout in 1923 (1). The names of several species of *Candida* have been changed. *C. stellatoidea*, *C. claussenii* and *C. langeronii* have been merged with *C. albicans* while *C. dubliniensis* was separated from *C. albicans* due to the different arrangement of the blastoconidia and the chlamydo spores (2). Germ tube formation and chlamydo spore formation are the two most reliable morphologic criteria for the identification of *C. albicans* (4). Cells of almost all clinical isolates of *C. albicans* are diploid (1). *C. albicans* is the species that is most commonly isolated from patients with nearly all forms of candidiasis.

Candida glabrata (Anderson) Meyer and Yarrow, 1978.

Candida glabrata was first named *Cryptococcus glabrata* by Anderson in 1917. Lodder and deVries in 1938 called it *Torulopsis glabrata*. The original separation of the genera was based on the inability of *Torulopsis sp.* to produce pseudohyphae, like other species of *Candida*.

However, this criterion appears to have been misapplied, leading to the incorrect generic name for the species *glabrata* (5). Meyer and Yarrow in 1978 introduced its present name. *C. glabrata* cells are ovoid and produce no pseudohyphae.

Candida tropicalis (Castellani) Berkhout, 1923:

Aldo Castellani (1877-1971), while he worked in Ceylon (Sri Lanka), differentiated several species of *Candida*; including *Candida tropicalis* in 1910. He called it *Oidium tropicale*. Other names given to this species have been *Monilia tropicalis*, *Candida vulgaris*, *Mycotorula dimorpha*, *Candida paratropicalis*. 58 synonyms have been applied to *C. tropicalis*. Berkhout introduced the present name in 1923 (1). It is germ tube negative and does not produce chlamydo-spores. *C. tropicalis* is a diploid *Ascomycetous* yeast (5).

Candida parapsilosis (Ashford) Langeron and Talice, 1932:

Synonyms include *Monilia onychopila* (Poll and Nann, 1926), *Monilia parapsilosis* (Ashford, 1928), *Mycocandida parapsilosis* (Dodge, 1935). *Candida parapsilosis* introduced by Langeron and Talice in 1932 is the current name of this diploid yeast. Colony morphology resembles that of *C. albicans*, but *C. parapsilosis* differs microscopically with their crooked or curved short pseudohyphae and occasional large hyphal elements called giant cells (2).

Candida krusei (Castellani) Berkhout, 1923:

Castellani described *C. krusei* in 1910 as *Sacharomyces krusei*, and as *Endomyces krusei* in 1912 (6). Chalmers (1913) named it *Monilia krusei*. 18 other synonyms were proposed before Berkhout renamed it in 1923 as *C. krusei*. Colonies of *C. krusei* appear similar to *C. albicans* and other pathogenic *Candida* species on Sabouraud's agar, but on cornmeal-Tween 80 agar *C. krusei* form pseudohyphae with elongated blastoconidia, giving the appearance of crossed match sticks or trees (1,2). *C. krusei* is inherently resistant to fluconazole.

Candida lusitanae van Uden and do Carmo-Sousa. 1959:

Dietrichson called this species *Candida parapsilosis* var. *obtusa* in 1954. In 1959 van Uden and do Carmo-Sousa named it *C. lusitanae*. It was first isolated from the alimentary canals of warm-blooded animals in Portugal. Since 1979 this species has been recognized as an opportunistic human pathogen, found in blood, urine, and the respiratory tract (1). *C. lusitanae* resembles *C. tropicalis* and *C. parapsilosis*, but differs in its ability to ferment cellobiose and assimilate rhamnose (2). *C. lusitanae* is generally a yeast of low virulence and it may be resistant to amphotericin B (4).

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