

Proposal for Amendment of the Diagnosis of the Genus *Candida* Berkhout nom. cons.

DAVID YARROW¹ AND SALLY A. MEYER²

Yeast Division, Centraalbureau voor Schimmelcultures, Laboratory of Microbiology, Julianalaan 67a, 2628 BC, Delft, The Netherlands,¹ and Department of Biology, Georgia State University, University Plaza, Atlanta, Georgia 30303²

The status of the genus *Torulopsis* Berlese is discussed. An amendment of the diagnosis of the genus *Candida* Berkhout is proposed to allow for nonhyphal species. In accordance with the amended description, the species currently classified in *Torulopsis* are transferred to the genus *Candida*.

During a revision of the species of the genus *Torulopsis* the problem of their correct name arose. The genus *Torulopsis* was established by Berlese (1) with *T. rosea* as the type species, but no culture was preserved. Lodder (4) thought that this species might be identified with *T. pulcherrima* (Linder) Saccardo. Windisch (10) found pseudohyphae in *T. pulcherrima* and transferred it to the genus *Candida*. Pitt and Miller (8) induced sporulation in several strains of *C. pulcherrima*, including the type, and described them as *Metschnikowia pulcherrima*. If the identification of *T. rosea* with *C. pulcherrima* were accepted, the genus *Torulopsis* Berlese would be typified by a species forming pseudohyphae. However, Diddens and Lodder (2), Lodder and Kreger-van Rij (5), and later authors consider the identification of *T. rosea* with *C. pulcherrima* to be doubtful. Because of this, Lodder and Kreger-van Rij (5) designated *T. colliculosa* Hartmann as the neotype species of *Torulopsis*, suggesting that the name *Torulopsis* could be retained under Article 48 which provides for conservation of a name in a sense that excludes the original type. However, since the name has not been conserved, *Torulopsis* sensu Lodder and Kreger-van Rij is, in effect, a junior homonym of *Torulopsis* Berlese and is therefore illegitimate. Since the application of *Torulopsis* Berlese has remained dubious, the use of this name should also be discontinued.

Another possible name is *Asporomyces* Chaborski (G. Chaborski, Ph.D. thesis, University of Geneva, Geneva, Switzerland, 1918), typified by *A. asporus* Chaborski for which no type strain is available. This name antedates *Candida* Berkhout, and the name *Candida* was not conserved against it. However, owing to the absence of a type strain, it is impossible to establish the application of the name *A. asporus*. A study of the description of *A. asporus* did not allow this taxon to be identified with any currently ac-

cepted species; therefore, a neotype strain can not be proposed to fix the application of this name. *Asporomyces* Chaborski must be considered a nomen dubium.

In their discussion of the genera *Candida* and *Torulopsis*, van Uden and Buckley (9) pointed out the arbitrary nature and artificiality of the separation of these two genera on the criterion of the ability to form pseudohyphae and concluded that it would be logical to unite them. They refrained from doing so, however, because of the name changes involved in such a step. As it is clear that the name *Torulopsis* can no longer be used and thus the former species of this genus must be renamed, it is preferable to transfer them to the genus *Candida* than to resort to the only other possibility, which is to describe a new and unnecessary form genus to replace *Torulopsis*. Therefore, amendment of the diagnosis of the genus *Candida* Berkhout from "pseudomycelium formation by all or most strains of all species and varieties" to "pseudohyphae absent, rudimentary or well developed" is proposed to allow inclusion of nonhyphal species. In accordance with this amended description, the species currently classified in *Torulopsis* are transferred to the genus *Candida*.

NEW COMBINATIONS

Candida anatomiae (Zwillenberg) Meyer et Yarrow comb. nov. Basionym: *Torulopsis anatomiae* Zwillenberg—Antonie van Leeuwenhoek J. Microbiol. Serol. **32**:136, 1966.

Candida apicola (Hajsig) Meyer et Yarrow comb. nov. Basionym: *Torulopsis apicola* Hajsig—Antonie van Leeuwenhoek J. Microbiol. Serol. **24**:18, 1958.

Candida apis (Lavie ex van Uden et Vidal-Leiria) Meyer et Yarrow comb. nov. Basionym: *Torulopsis apis* Lavie ex van Uden et Vidal-Leiria—In J. Lodder (ed.), *The Yeasts, a Tax-*

onomic Study, p. 1246. North Holland Publishing Co., Amsterdam, 1970.

Candida auriculariae (Nakase) Meyer et Yarrow comb. nov. Basionym: *Torulopsis auriculariae* Nakase—*J. Gen. Appl. Microbiol.* 17: 413, 1971.

Candida austromarina (Fell et Hunter) Meyer et Yarrow comb. nov. Basionym: *Torulopsis austromarina* Fell et Hunter—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 40:39, 1974.

Candida azyma (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis azyma* van der Walt et al.—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 44:100, 1978.

Candida bacarum (Buhagiar) Meyer et Yarrow comb. nov. Basionym: *Torulopsis bacarum* Buhagiar—*J. Gen. Microbiol.* 86:2, 1975.

Candida bombicola (Spencer et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis bombicola* Spencer et al.—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 36:130, 1970.

Candida cantarellii (van der Walt et van Kerken) Meyer et Yarrow comb. nov. Basionym: *Torulopsis cantarellii* van der Walt et van Kerken—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 27:210, 1961.

Candida castellii (Capriotti) Meyer et Yarrow comb. nov. Basionym: *Torulopsis castellii* Capriotti—*J. Gen. Microbiol.* 26:42, 1961.

Candida colliculosa (Hartmann) Meyer et Yarrow comb. nov. Basionym: *Torula colliculosa* Hartmann—*Wochenschr. Brau.* 20:113, 1903 [st. ascig. *Torulaspora delbrueckii* (Lindner) Lindner].

Candida dattila (Kluyver) Meyer et Yarrow comb. nov. Basionym: *Torulopsis dattila* Kluyver—*Biochemische suikerbepalingen*, Ph.D. thesis, University of Delft, Delft, The Netherlands, 1914, p. 14. [st. ascig. *Kluyveromyces thermotolerans* van der Walt et Johannsen].

Candida dendrica (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis dendrica* van der Walt et al.—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 37:461, 1971.

Candida domercqii (van der Walt et van Kerken) Meyer et Yarrow comb. nov. Basionym: *Torulopsis domercqii* van der Walt et van Kerken—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 26:315, 1960. [st. ascig. *Wickerhamiella domercqii* van der Walt.]

Candida ernobii (Lodder et Kreger-van Rij) Meyer et Yarrow comb. nov. Basionym: *Torulopsis ernobii* Lodder et Kreger-van Rij—*The Yeasts, a Taxonomic Study*, p. 671. North Holland Publishing Co., Amsterdam, 1952.

Candida etchellsii (Lodder et Kreger-van Rij) Meyer et Yarrow comb. nov. Basionym: *Toru-*

opsis etchellsii Lodder et Kreger-van Rij—*The Yeasts, a Taxonomic Study*, p. 670. North Holland Publishing Co., Amsterdam, 1952.

Candida famata (Harrison) Meyer et Yarrow comb. nov. Basionym: *Mycotorula famata* Harrison—*Trans. Roy. Soc. Can. Sect. 5 Ser. 3* 22:216, 1928. The name *Torula candida* Saito 1922 has priority but, as the combination *Candida candida* is tautonymous, this name would be illegitimate under Article 23 and therefore cannot be used. [st. ascig. *Debaryomyces hansenii*.]

Candida fragariae (Barnett et Buhagiar) Meyer et Yarrow comb. nov. Basionym: *Torulopsis fragariae* Barnett et Buhagiar—*J. Gen. Microbiol.* 67:237, 1971.

Candida fructus (Nakase) Meyer et Yarrow comb. nov. Basionym: *Torulopsis fructus* Nakase—*J. Gen. Appl. Microbiol.* 17:415, 1971.

Candida fujisanensis (Soneda) Meyer et Yarrow comb. nov. Basionym: *Torulopsis fujisanensis* Soneda—*Nagaoa* 6:17, 1959.

Candida geochares (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis geochares* van der Walt et al.—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 44:98, 1978.

Candida glabrata (Anderson) Meyer et Yarrow comb. nov. Basionym: *Cryptococcus glabrata* Anderson—*J. Infect. Dis.* 21:379, 1917.

Candida gropengiesseri (Harrison) Meyer et Yarrow comb. nov. Basionym: *Torula gropengiesseri* Harrison—*Trans. Roy. Soc. Can. Sect. 5, Ser. 3* 22:204, 1928.

Candida haemulonii (van Uden et Kolipinski) Meyer et Yarrow comb. nov. Basionym: *Torulopsis haemulonii* van Uden et Kolipinski—*Antonie van Leeuwenhoek J. Microbiol. Serol.* 28:78, 1962.

Candida halonitratophila (Onishi ex van Uden et Vidal-Leiria) Meyer et Yarrow comb. nov. Basionym: *Torulopsis halonitratophila* Onishi ex van Uden and Vidal-Leiria—*In J. Lodder (ed.), The Yeasts, a Taxonomic Study*, p. 1272. North Holland Publishing Co., Amsterdam, 1970.

Candida holmii (Jørgensen) Meyer et Yarrow comb. nov. Basionym: *Torula holmii* Jørgensen—*Die Microorganismen der Gärungsindustrie*, 5 Aufl., p. 395, 1909.

Candida humilis (Nel et van der Walt) Meyer et Yarrow comb. nov. Basionym: *Torulopsis humilis* Nel et van der Walt—*Mycopathol. Mycol. Appl.* 36:95, 1968.

Candida inconspicua (Lodder et Kreger-van Rij) Meyer et Yarrow comb. nov. Basionym: *Torulopsis inconspicua* Lodder et Kreger-van Rij—*The Yeasts, a Taxonomic Study*, p. 671.

North Holland Publishing Co., Amsterdam, 1952.

Candida ingeniosa (di Menna) Meyer et Yarrow comb. nov. Basionym: *Torulopsis ingeniosa* di Menna—J. Gen. Microbiol. **19**:581, 1958.

Candida insectalens (Scott et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis insectalens* Scott et al.—Antonie van Leeuwenhoek J. Microbiol. Serol. **37**:467, 1971.

Candida kestonii (Scarr et Rose) Meyer et Yarrow comb. nov. Basionym: *Torulopsis kestonii* Scarr et Rose—J. Gen. Microbiol. **45**:15, 1966.

Candida kruisii (Kocková-Kratochvílová et Ondrusová) Meyer et Yarrow comb. nov. Basionym: *Torulopsis kruisii* Kocková-Kratochvílová et Ondrusová—Biologia (Bratislava) **26**:479, 1971.

Candida lactis-condensii (Hammer) Meyer et Yarrow comb. nov. Basionym: *Torula lactis-condensii* Hammer—Iowa State Coll. Agr. Exp. Stat. Res. Bull. **54**:217, 1919.

Candida magnoliae (Lodder et Kreger-van Rij) Meyer et Yarrow comb. nov. Basionym: *Torulopsis magnoliae* Lodder et Kreger-van Rij—*The Yeasts, a Taxonomic Study*, p. 671. North Holland Publishing Co., Amsterdam, 1952.

Candida mannitofaciens (Onishi et Suzuki) Meyer et Yarrow comb. nov. Basionym: *Torulopsis mannitofaciens* Onishi et Suzuki—Antonie van Leeuwenhoek J. Microbiol. Serol. **35**:258, 1969.

Candida maris (van Uden et Zobell) Meyer et Yarrow comb. nov. Basionym: *Torulopsis maris* van Uden et Zobell—Antonie van Leeuwenhoek J. Microbiol. Serol. **28**:281, 1962.

Candida methanolovescens (Oki et Kounu) Meyer et Yarrow comb. nov. Basionym: *Torulopsis methanolovescens* Oki et Kounu—J. Gen. Appl. Microbiol. **18**:301, 1972. Typus: FERM no. 1107 ex *Rhododendron indicum* flux siccatus.

Candida molischiana (Zikes) Meyer et Yarrow comb. nov. Basionym: *Torula molischiana* Zikes—Zentralbl. Bakteriologie, Parasitenkd., Infektionskr. Hyg. Abt. II **30**:634, 1911.

Candida multis-gemmis (Buhagiar) Meyer et Yarrow comb. nov. Basionym: *Torulopsis multis-gemmis* Buhagiar—J. Gen. Microbiol. **86**:7, 1975.

Candida musae (Nakase) Meyer et Yarrow comb. nov. Basionym: *Torulopsis musae* Nakase—J. Gen. Appl. Microbiol. **17**:416, 1971.

Candida nagoyaensis (Asai et Makiguchi) Meyer et Yarrow comb. nov. Basionym: *Torulopsis nagoyaensis* Asai et Makiguchi—J. Gen. Appl. Microbiol. **22**:198, 1976.

Candida navarrensis (Moriyón et Ramirez) Meyer et Yarrow comb. nov. Basionym: *Torulopsis navarrensis* Moriyón et Ramirez—Proc. 4th Int. Symp. Yeasts, Vienna, p. 223, 1974.

Candida nemodendra (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis nemodendra* van der Walt et al.—Antonie van Leeuwenhoek J. Microbiol. Serol. **37**:468, 1971.

Candida nitratophila (Shifrine et Phaff) Meyer et Yarrow comb. nov. Basionym: *Torulopsis nitratophila* Shifrine et Phaff—Mycologia **48**:48, 1956.

Candida norvegica (Reiersöl) Meyer et Yarrow comb. nov. Basionym: *Torulopsis norvegica* Reiersöl—Antonie van Leeuwenhoek J. Microbiol. Serol. **24**:111, 1958.

Candida pampelonensis (Ramirez et Martinez) Meyer et Yarrow comb. nov. Basionym: *Torulopsis pampelonensis* Ramirez et Martinez—Can. J. Microbiol. **24**:435, 1978.

Candida philyla (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis philyla* van der Walt et al.—Antonie van Leeuwenhoek J. Microbiol. Serol. **37**:464, 1971.

Candida pignaliae (Jacob) Meyer et Yarrow comb. nov. Basionym: *Torulopsis pignaliae* Jacob—Ann. Inst. Pasteur (Paris) **118**:210, 1970.

Candida pintolopesii (van Uden) Meyer et Yarrow comb. nov. Basionym: *Torulopsis pintolopesii* van Uden—Arch. Mikrobiol. **17**:207, 1952. [st. ascig. *Saccharomyces telluris* van der Walt.]

Candida pinus (Lodder et Kreger-van Rij) Meyer et Yarrow comb. nov. Basionym: *Torulopsis pinus* Lodder et Kreger-van Rij—*The Yeasts, a Taxonomic Study*, p. 671. North Holland Publishing Co., Amsterdam, 1952.

Candida psychrophila (Goto et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis psychrophila* Goto et al.—Mycologia **61**:761, 1969.

Candida pustula (Buhagiar) Meyer et Yarrow comb. nov. Basionym: *Torulopsis pustula* Buhagiar—J. Gen. Microbiol. **86**:3, 1975.

Candida schatavii (Kocková-Kratochvílová et Ondrusová) Meyer et Yarrow comb. nov. Basionym: *Torulopsis schatavii* Kocková-Kratochvílová et Ondrusová—Biologia (Bratislava) **26**:483, 1971.

Candida silvatica (van der Walt et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis silvatica* van der Walt et al.—Antonie van Leeuwenhoek J. Microbiol. Serol. **37**:465, 1971.

Candida sonorensis (Miller et al.) Meyer et Yarrow comb. nov. Basionym: *Torulopsis sonorensis* Miller et al.—Int. J. Syst. Bacteriol. **26**:88, 1976.

Candida sorbophila (Nakase) Meyer et Yar-

row comb. nov. Basionym: *Torulopsis sorbophilila* Nakase—Antonie van Leeuwenhoek J. Microbiol. Serol. 41:207, 1975.

Candida sphaerica (Hammer et Cordes) Meyer et Yarrow comb. nov. Basionym: *Torula sphaerica* Hammer et Cordes—Iowa State Coll. Agr. Exp. Stat. Res. Bull. 61:14, 1920. [st. ascig. *Kluyveromyces lactis* (Dombr.) van der Walt.]

Candida spandovensis (Henninger et Windisch) Meyer et Yarrow comb. nov. Basionym: *Torulopsis spandovensis* Henninger et Windisch—Arch. Microbiol. 107:206, 1976.

Candida stellata (Kroemer et Krumbholz) Meyer et Yarrow comb. nov. Basionym: *Saccharomyces stellatus* Kroemer et Krumbholz—Arch. Mikrobiol. 2:608, 1931.

Candida tannotolerans (Jacob) Meyer et Yarrow comb. nov. Basionym: *Torulopsis tannotolerans* Jacob—Ann. Inst. Pasteur (Paris) 118:207, 1970.

Candida torresii (van Uden et Zobell) Meyer et Yarrow comb. nov. Basionym: *Torulopsis torresii* van Uden et Zobell—Antonie van Leeuwenhoek J. Microbiol. Serol. 28:279, 1962.

Candida vanderwaltii (Vidal-Leiria) Meyer et Yarrow comb. nov. Basionym: *Torulopsis vanderwaltii* Vidal-Leiria—Antonie van Leeuwenhoek J. Microbiol. Serol. 32:447, 1966.

Candida versatilis (Etechells and Bell) Meyer et Yarrow comb. nov. Basionym: *Brettanomyces versatilis* Etechells et Bell—Farlowia 4:106, 1950.

Candida wickerhamii (Capriotti) Meyer et Yarrow comb. nov. Basionym: *Torulopsis wickerhamii* Capriotti—Arch. Mikrobiol. 30:386, 1958.

The following five species have been named, but valid descriptions have not been published: *Torula globosa* (6), *Torulopsis karawaiewii* and *T. xestobii* (3), *T. halophilus* and *T. nodaensis* (7). They will be described here as new species of the genus *Candida*.

Candida globosa Yarrow et Meyer sp. nov. [st. acig. *Citeromyces matritensis* (Santa Maria) Santa Maria.] In medio liquido cum glucoso et extracto levedinis et peptono post dies 3 in 25°C cellulae globosae aut subglobosae (4.5–7.0 µm), singulae aut binae. Pseudohyphae nullae. Ascosporae nullae. Glucosum, sucrosum et raffinose fermentantur. Glucosum, L-sorbosum, sucrosum, maltosum, trehalosum, raffinose, inulinum (exigue), glycerolum, ribitolium, D-mannitolium, D-glucitolium, α-methyl-D-glucosidum, acidum lacticum (exigue), acidum citricum (exigue), et nitras kalii assimilantur. Ad crescentiam vitaminæ externae necessariae sunt. Crescere non potest in 37°C. Proportio

molaris guanini et cytosini in acido deoxyribonucleico 46 mol%. Typus: CBS 162 isolatus ex lacte densato et dulcem facto.

Candida halophila Yarrow et Meyer sp. nov. In medio liquido cum glucoso et extracto levedinis et peptono post dies 3 in 25°C cellulae globosae aut subglobosae (2.0–5.0) × (2.0–4.0) µm, singulae aut binae. Pseudohyphae nullae. Ascosporae nullae. Glucosum, galactosum et sucrosum (lente) fermentantur. Glucosum, galactosum, sucrosum, cellobiosum, trehalosum, L-arabinosum (lente), glycerolum, D-mannitolium, salicinum, arbutinum, acidum succinicum, acidum citricum, et nitras kalii assimilantur. Ad crescentiam vitaminæ externae necessariae sunt. Crescere non potest in 37°C. Typus: CBS 4019, isolatus ex fabis contusis *Soya hispida*.

Candida karawaiewii Yarrow et Meyer sp. nov. In medio liquido cum glucoso et extracto levedinis et peptono post dies 3 in 25°C cellulae globosae aut subglobosae (3.0–4.5) × (2.5–4.0) µm, singulae aut binae. Pseudohyphae nullae. Ascosporae nullae. Glucosum fermentatur. Glucosum, glycerolum, ribitolium (variabile), D-mannitolium, D-glucitolium, salicinum (variabile), arbutinum, acidum succinicum (variabile), et acidum citricum (variabile) assimilantur. Ad crescentiam vitaminæ externae necessariae sunt. Crescere non potest in 37°C. Proportio molaris guanini et cytosini in acido deoxyribonucleico 35 mol%. Typus: CBS 5214, isolatus ex larva *Ernobius abietis*.

Candida nodaensis Yarrow et Meyer sp. nov. In medio liquido cum glucoso et extracto levedinis et peptono post dies 3 in 25°C cellulae subglobosae aut ellipsoideae (3.0–4.5) × (2.0–3.0) µm, singulae aut binae. Pseudohyphae nullae. Ascosporae nullae. Glucosum et maltosum (variabile) fermentantur. Glucosum, galactosum, L-sorbosum, maltosum, glycerolum, D-mannitolium, D-glucitolium, acidum citricum, et nitras kalii assimilantur. Ad crescentiam vitaminæ externae necessariae sunt. Crescere non potest in 37°C. Proportio molaris guanini et cytosini in acido deoxyribonucleico 53 mol%. Typus: CBS 3094 isolatus ex fabis contusis *Soya hispida*.

Candida xestobii Yarrow et Meyer sp. nov. In medio liquido cum glucoso et extracto levedinis et peptono post dies 3 in 25°C cellulae ellipsoideae (3.0–4.5) × (3.5–6.0) µm, singulae aut binae. Pseudohyphae nullae. Ascosporae nullae. Glucosum fermentatur. Glucosum, galactosum, L-sorbosum, sucrosum, maltosum, cellobiosum (lente), trehalosum, melibiosum

(lente), raffinose, melezitose, xyloso, L-arabino, riboso, glicerolo, ribitolo, α -metil-D-glucosio, salicino (lente), arbutino (lente), acido succinico, et acido citrico assimilantur. Vitaminae externae necessariae sunt. Crescere non potest in 37°C. Proportio molaris guanini et cytosini in acido deoxyribonucleico 48 mol%. Typus: CBS 5975 isolatus ex *Xestobium plumbeum*.

ACKNOWLEDGMENTS

The work performed at Georgia State University was supported in part by Public Health Service grant GM 24543-01 from the National Institute of General Medical Sciences.

REPRINT REQUESTS

Address reprint requests to: Dr. D. Yarrow, Yeast Division, Centraalbureau voor Schimmelcultures, Laboratory of Microbiology, Julianalaan 67a, 2628 BC, Delft, The Netherlands.

LITERATURE CITED

1. Berlese, A. N. 1895. I funghi diversi dai Saccaromiceti e capaci di determinare la fermentazione alcoolica. G. Viticolt. Enol. 3:52-55.
2. Diddens, H. A., and J. Lodder. 1942. Die anaskosporogenen Hefen, zweite Hälfte. North Holland Publishing Co., Amsterdam.
3. Jurzitza, G. 1970. Über Isolierung, Kultur und Taxonomic einiger Anobiidensymbioten (Insecta, Coleoptera). Arch. Mikrobiol. 72:203-222.
4. Lodder, J. 1938. *Torulopsis* or *Cryptococcus*? Mycopathologia 1:62-67.
5. Lodder, J., and N. J. W. Kreger-van Rij. 1952. The yeasts, a taxonomic study. North Holland Publishing Co., Amsterdam.
6. Olson, H. C., and B. W. Hammer. 1935. Observations on yeasts causing gas in sweetened condensed milk. Iowa State Coll. Agr. Exp. Stat. J. 10:37-43.
7. Onishi, H. 1957. Studies on osmophilic yeasts. III. Classification of osmophilic soy and miso yeasts. Bull. Agr. Chem. Soc. Jpn. 21:151-156.
8. Pitt, J. I., and M. W. Miller. 1968. Sporulation in *Candida pulcherrima*, *Candida reukaufii* and *Chlamydozoma* species; their relationship with *Metschnikowia*. Mycologia 60:663-685.
9. van Uden, N., and H. Buckley. 1970. *Candida* Berkhout, p. 893-1087. In J. Lodder (ed.), The yeasts, a taxonomic study. North Holland Publishing Co., Amsterdam.
10. Windisch, S. 1940. Entwicklungsgeschichtliche Untersuchungen an *Torulopsis pulcherrima* (Lindner) Saccardo und *Candida tropicalis* (Castellani) Berkhout. Ein Beitrag zur Systematik der Gärungsmonilien. Arch. Mikrobiol. 11:368-390.