

*Vishniacozyma phoenicis*



Fungal Planet 1110 – 29 June 2020

***Vishniacozyma phoenicis* Kachalkin, A.S. Venzhik & M.A. Tomashevskaya, sp. nov.**

**Etymology.** Name *phoenicis* refers to the date palm, from which fruits the strains were isolated.

**Classification** — *Bulleribasidiaceae*, *Tremellales*, *Tremellomycetes*.

On glucose peptone yeast extract agar (GPYA) and 5 % malt extract agar (MEA), after 7 d at 22 °C, *streak* is pale yellow-brown to cream, shiny and mucoid, with an entire, somewhat undulating margin. *Cells* are ellipsoidal, 3–5 × 1.5–2 µm, occur singly or in pairs, divide by polar budding. *Sexual structures, pseudohyphae, true hyphae* and *ballistoconidia* not observed during 4 wk at 22 °C in culture (pure cultures and in mating test) grown on GPYA, MEA, potato dextrose agar (PDA), yeast nitrogen base with 0.5 % glucose (YNB) agar, cornmeal agar and Gorodkova agar. Glucose is not fermented. Glucose, galactose, L-sorbose (weak), sucrose, maltose, lactose, melibiose, cellobiose, trehalose, raffinose, melezitose, D-xylose, L-arabinose, D-arabinose, D-ribose, L-rhamnose, soluble starch (weak), ethanol (weak), glycerol, erythritol, ribitol, galactitol, D-mannitol, D-glucitol, *myo*-inositol, methyl alpha-D-glucoside (weak), salicin, DL-lactic acid (weak), citric acid, succinic acid, D-gluconate, D-gluconate, D-glucosamine (weak), N-Acetyl-D-glucosamine, 2-keto-D-gluconate, 5-keto-D-gluconate and arbutin are assimilated; no growth occurs on inulin, methanol, hexadecane. Nitrogen compounds: ammonium sulfate, potassium nitrate, L-lysine, D-glucosamine, creatinine and creatine are assimilated. Growth on vitamin-free medium, on MEA with 10 % NaCl and on 50 % w/w glucose / yeast extract (0.5 %) agar is positive. Growth with 0.01 % cycloheximide is weak. Starch-like compounds are produced. Diazonium blue B colour and urease reactions are positive. Maximum growth temperature is 31 °C.

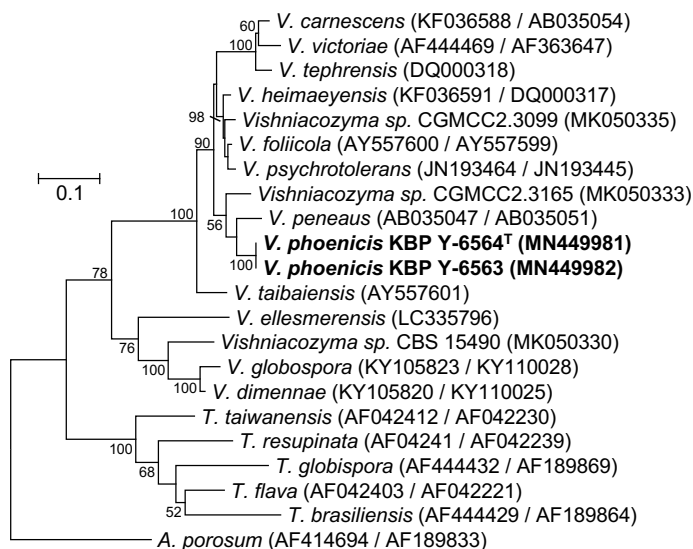
**Typus.** RUSSIA, Moscow, from dates fruit bought on local market, July 2017, A.S. Venzhik, 77m-1 (holotype KBP Y-6564 preserved in a metabolically inactive state, ex-type cultures VKM Y-3040 = DSM 110121 = CBS 16172; SSU, ITS-D1/D2 domains of LSU nrDNA, *TEF1* and *RPB1* sequences GenBank MN449979, MN449981, LR701186 and LR701187, MycoBank MB833068).

**Additional material examined.** RUSSIA, Moscow, from dates fruit bought on local market, July 2017, A.S. Venzhik, KBP Y-6563; ITS-D1/D2 domains of LSU nrDNA sequence GenBank MN449982.

**Notes** — Analysis of the ITS-D1/D2 regions of the surveyed yeasts suggested that they were conspecific and represented a hitherto undescribed species of *Vishniacozyma*. Based on the NCBI GenBank database, the best hits using the ITS se-

**Colour illustrations.** Russia, Moscow, dates fruit on local market. *Vishniacozyma phoenicis* KBP Y-6564: growth of yeast colonies on MEA, yeast cells on MEA (after 7 d at 22 °C). Scale bar = 5 µm.

quence are *V. heimaeyensis* CBS 8933<sup>T</sup> (GenBank NR\_077070; 95.20 % similar, 12 subst. and 7 gaps) and *V. pseudopenaeus* CGMCC2.3165<sup>T</sup> (GenBank MK050333; 95.17 % similar, 12 subst. and 7 gaps); using **LSU** these are *V. peneaus* CBS 2409<sup>T</sup> (GenBank NG\_058433; 98.91 % similar, 6 subst.) and some strains (with 3–5 subst.) from coffee (GenBank KM246137, KM246008, KM246009, KM246021, KM246105, KM246144), soybean (Leite et al. 2013; GenBank KM246053) in Brazil and from *Atta texana* nest from USA (Rodrigues et al. 2009; GenBank FJ743602); using **SSU** these are strain *V. pseudopenaeus* CGMCC2.3165<sup>T</sup> (GenBank MK050333; 99.58 % similar, 7 subst.) and *V. peneaus* CBS 2409<sup>T</sup> (GenBank NG\_062136; 99.46 % similar, 9 subst.); using **TEF1** it is *V. heimaeyensis* CBS 8933<sup>T</sup> (GenBank KF037060; 89.36 % similar, 41 subst. and 12 gaps); and using **RPB1** it is *V. peneaus* CBS 2409<sup>T</sup> (GenBank KF036392; 81.31 % similar, 120 subst. and 17 gaps). In compliance with a recent phylogenetic analysis of the genus (Tsuji et al. 2019), the placement of the new species is demonstrated using the combined ITS and LSU rDNA phylogeny. *Vishniacozyma phoenicis* differs from other species of the genus by good growth (*V. taibaiensis* with weak growth) on 50 % w/w glucose media. The new species can be also differentiated from *V. peneaus* based on its ability to assimilate ethanol, creatinine, potassium nitrate, growth on vitamin-free medium and on MEA with 10 % NaCl, and differ from *V. pseudopenaeus* by its ability to assimilate DL-lactic acid and soluble starch, production of starch-like compounds and its inability to growth at 32 °C



Maximum likelihood (ML) tree obtained from the combined analysis of ITS and LSU sequence data. Bootstrap support values above 55 % are shown at the nodes. The alignment included 1082 bp and was performed with MAFFT v. 7 (Katoh et al. 2019). The General Time Reversible model (GTR) with Gamma distribution and invariant sites (G+I) was used as the best nucleotide substitution model. Phylogenetic analysis was conducted in MEGA v. 6 (Tamura et al. 2013).

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