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Priority of *Klebsiella planticola* Bagley, Seidler, and Brenner 1982 over *Klebsiella trevisanii* Ferragut, Izard, Gavini, Kersters, DeLey, and Leclerc 1983

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The published descriptions of *Klebsiella planticola* Bagley, Seidler, and Brenner 1982 and *Klebsiella trevisanii* Ferragut, Izard, Gavini, Kersters, De Ley, and Leclerc 1983 are very similar. The reactions given by the type strains of *K. planticola* and *K. trevisanii* were identical when these strains were submitted to 51 common tests and in 118 of 119 nutritional tests. The level of deoxyribonucleic acid relatedness between the two type strains was 79 to 94% (nitrocellulose filter method) or 70 to 104% (S1 nuclease method) depending on which deoxyribonucleic acid was tritium labeled. Heteroduplexes showed a thermal stability very close to that of homoduplexes. Thus, *K. planticola* and *K. trevisanii* are subjective synonyms. Since *K. planticola* has priority over *K. trevisanii*, *K. planticola* should be the only name used to refer to the species formerly designated *K. planticola* or *K. trevisanii*.

In 1977, a numerical taxonomy study uncovered a new group of *Klebsiella* provisionally called group K (8). Strains in group K were isolated from surface water, grew at 4°C but not at 44.5°C, and failed to utilize *m*-hydroxybenzoate and melezitose and to reduce tetrathionate (8).

In 1979, another numerical study produced evidence of another group, group 4, which was composed of strains recovered from vegetables, vegetable seeds, and wood pulp (13). Strains in group 4 grew at 10°C but not at 44.5°C and failed to utilize *m*-hydroxybenzoate and melezitose (13). Group 4 was shown to constitute a deoxyribonucleic acid (DNA) relatedness group distinct from *Klebsiella pneumoniae* and *Klebsiella oxytoca* (14).

Group 4 was named *Klebsiella planticola* in 1981 (1), and this name was validated in the *International Journal of Systematic Bacteriology* in 1982 (10). Independently, in 1983 the name *Klebsiella trevisanii* was given (6) to group K of Gavini et al. (8).

Since the descriptions of *K. planticola* and *K. trevisanii* are almost identical, the present study was undertaken to examine the possible synonymy of these two nomenspecies. A phenotypic comparison of, and the level of DNA relatedness between, the type strains of *K. planticola* and *K. trevisanii* indicated that both names apply to a single species, whose name should be *K. planticola* on the basis of priority.

Bacterial strains. The type strain of *K. planticola* was received from the Collection de l'Institut Pasteur, Paris, France (strain CIP 100.751), which had just received it from the American Type Culture Collection, Rockville, Md. (strain ATCC 33531). The type strain of *K. trevisanii*, strain CUETM 78-120, was obtained from the Collection de l'Unité d'Ecotoxicologie Microbienne, Villeneuve d'Ascq, France. The other strains included in this work for comparative purposes are listed in Table 1.

DNA-DNA hybridization. DNA reassociation experiments were done in Villeneuve d'Ascq and in Paris by using two methods. In Villeneuve d'Ascq, DNAs were extracted (12), ^{3}H labeled, and sheared as described previously (6). Reassociation of DNAs was studied by a nitrocellulose method with competition as previously described (5). In Paris, DNAs were extracted, purified, and sheared (3) and then ^{3}H labeled by nick translation and hybridized by using the S1 nuclease-trichloroacetic acid method as described previously (9). The temperature at which 50% of the reassociated DNA became hydrolyzable by S1 nuclease (T_m) was determined by the method of Crosa et al. (4); ΔT_m is the difference between the T_m of the heterologous DNA reaction and the T_m of the homologous DNA reaction.

Biochemical tests. The biochemical tests were done in Villeneuve d'Ascq as described elsewhere (8).

Assimilation tests. Carbon source utilization tests were done in Paris by using specially manufactured API strips (API System, La Balme les Grottes, France) which contained pure carbon sources and were similar to commercial API CH, API AO, and API AA galleries (7), except that the total number of carbon sources tested was 119 (these compounds are listed below). The minimal medium without growth factors was supplied by API System. The strips were inoculated as described previously (2), incubated at 30°C, and examined for growth daily for 4 days.

DNA relatedness. The level of DNA relatedness between the type strains of *K. planticola* and *K. trevisanii* was 79 to 94% (nitrocellulose filter method) or 70 to 104% (S1 nuclease method) depending on which DNA was labeled (Table 1). Heteroduplexes were stable (ΔT_m, less than 2°C). Type or reference strains of the other *Klebsiella* species were less than 62% (nitrocellulose filter method) or 49% (S1 nuclease method) related to *K. planticola* or *K. trevisanii*, with ΔT_m values of more than 13.5°C.

Comparison of biochemical characters. Both type strains gave positive reactions in the following tests: lysine

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TABLE 1. Reassociation of DNAs from *K. trevisanii* ATCC 33558^T and *K. planticola* CIP 100.751^T with DNAs from other *Klebsiella* strains

Source of unlabeled DNA[a]	% Reassociation with labeled DNA from:			
	K. trevisanii ATCC 33558^T		*K. planticola* CIP 100.751^T	
	Filter method	S1 nuclease method	Filter method	S1 nuclease method
K. planticola CIP 100.751^T	79	70 (1.0)[b]	100	100 (0.0)
K. trevisanii ATCC 33558^T	100	100 (0.0)	94	104 (2.0)
K. trevisanii CUETM 78-92	83	ND[c]	89	ND
K. trevisanii CUETM 78-116	83	ND	84	ND
K. trevisanii CUETM 78-117	90	ND	91	ND
K. pneumoniae ATCC 13883^T	55	ND	44	ND
K. pneumoniae ATCC 13882	53	ND	50	ND
K. pneumoniae Brenner 2	ND	ND	ND	30 (18.0)
K. oxytoca ATCC 13182^T	62	ND	51	ND
K. oxytoca CDC 131-82	ND	ND	ND	21 (20.0)
K. terrigena CIP 80.07^T	58	ND	59	49 (13.5)
K. mobilis ATCC 13048^T	42	ND	45	ND

[a] ATCC, American Type Culture Collection, Rockville, Md.; Brenner, D. J. Brenner, Centers for Disease Control, Atlanta, Ga.; CDC, Centers for Disease Control, Atlanta, Ga.; CIP, Collection de l'Institut Pasteur, Paris, France; CUETM, Collection de l'Unité d'Ecotoxicologie Microbienne, Villeneuve d'Ascq, France.

[b] The values in parentheses are ΔT_m values (in degrees centigrade).

[c] ND, Not determined.

decarboxylase; urease; β-xylosidase; Voges-Proskauer; nitrate reduction; Simmons citrate; malonate; mucate; L-tartrate; growth on KCN; acid from L-arabinose, D-ribose, D-xylose, D-galactose, D-glucose, D-mannose, L-rhamnose, D-fructose, α-methyl-D-glucoside, cellobiose, lactose, maltose, melibiose, raffinose, sucrose, trehalose, glycerol, adonitol, *myo*-inositol, D-mannitol, sorbitol, salicin, and L-sorbose; gas from glucose; and esculin hydrolysis. Both strains gave negative reaction in the following tests: motility; gelatinase; deoxyribonuclease; tetrathionate reductase; phenylalanine deaminase; chitinolysis; Tween 80 hydrolysis; indole and H_2S production; pectate and starch hydrolysis; and acid from melezitose, glycogen, dulcitol, and *meso*-erythritol.

Comparison of nutritional abilities. Both type strains utilized the following carbon sources: acetate, *N*-acetyl-D-glucosamine, adonitol, D-alanine, L-alanine, L-arabinose, D-arabitol, L-aspartate, benzoate, cellobiose, citrate, *p*-coumarate, esculin, D-fructose, α-L-(−)-fucose, fumarate, D-galactose, D-galacturonate, gentiobiose, D-gluconate, D-glucosamine, α-D-glucose, D-glucuronate, L-glutamate, DL-glycerate, glycerol, histamine, L-histidine, *p*-hydroxybenzoate, DL-β-hydroxybutyrate, *myo*-inositol, 2-keto-D-gluconate, 5-keto-D-gluconate, DL-lactate, α-lactose, lactulose, D-malate, L-malate, malonate, maltitol, maltose, maltotriose, D-mannitol, D-mannose, melibiose, 1-*O*-methyl-α-D-galactopyranoside, 1-*O*-methyl-β-D-galactopyranoside, 3-*O*-methyl-D-glucopyranose, 1-*O*-methyl-α-D-glucopyranoside, 1-*O*-methyl-β-D-glucopyranoside, mucate, palatinose, phenylacetate, L-proline, protocatechuate, putrescine, pyruvate, (−)-quinate, raffinose, L-rhamnose, D-ribose, D-saccharate, salicin, L-serine, D-sorbitol, L-sorbose, succinate, sucrose, *meso*-tartrate, trehalose, and D-xylose.

Neither strain utilized the following carbon sources: *trans*-aconitate, β-alanine, DL-δ-amino-*n*-valerate, anthranilate, L-arabitol, betaine, *n*-butyrate, caprate, caprylate, 2-deoxy-D-glucose, 2,3-dihydroxybenzoate, 2,4-dihydroxybenzoate, 3,5-dihydroxybenzoate, dulcitol, *i*-erythritol, ethanolamine, ferulate, gentisate, glutarate, glycine, heptanoate, *m*-hydroxybenzoate, itaconate, α-ketoglutarate, D-lyxose, melezitose, L-methionine, methyl-α-D-mannoside, α-methyl-D-xyloside, perseitol, 3-phenylpropionate, propionate, sarcosine, D-tagatose, D-tartrate, L-tartrate, L-threonine, tricarballylate, trigonelline, tryptamine, D-tryptophan, L-tryptophan, turanose, L-tyrosine, vanillate, and xylitol.

K. planticola CIP 100.751^T (T = type strain) grew in 2 days on *cis*-aconitate, whereas *K. trevisanii* CUETM 78-120^T did not grow on this substrate.

The published descriptions of *K. planticola* (1) and *K. trevisanii* (6) are so similar that differentiation between the two species is impractical. The phenotypic similarity between the two type strains was found to be overwhelming. In addition, both type strains belong to a single DNA relatedness group. Thus, *K. planticola* and *K. trevisanii* are subjective synonyms. Keeping both names in usage would only cause confusion. Since the *International Code of Nomenclature of Bacteria* (11) states that each taxon with a given position can bear only one correct epithet (that is, the earliest epithet that is in accordance with the Rules of the *Code*), the name *Klebsiella planticola* Bagley, Seidler, and Brenner 1982 has priority over *Klebsiella trevisanii* Ferragut, Izard, Gavini, Kersters, De Ley, and Leclerc 1983. We recommend that the name *K. planticola* be used for the species described by Ferragut et al. (6) and Bagley et al. (1).

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