

NOTE

Description of *Skermanella parooensis* gen. nov., sp. nov. to accommodate *Conglomeromonas largomobilis* subsp. *parooensis* following the transfer of *Conglomeromonas largomobilis* subsp. *largomobilis* to the genus *Azospirillum*

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As a consequence of the transfer of the type species *Conglomeromonas largomobilis* subsp. *largomobilis* to the genus *Azospirillum*, the name of the genus *Conglomeromonas* must be changed in accordance with Rule 37a(1) of the International Code of Nomenclature of Bacteria. Consequently, it is proposed that the subspecies *Conglomeromonas largomobilis* subsp. *parooensis* be transferred to the genus *Skermanella* gen. nov. as the type species *Skermanella parooensis* gen. nov., sp. nov. This taxon belongs to an isolated subline of descent in the *Azospirillum* branch of the α -Proteobacteria. The spelling of the specific epithet of *Azospirillum largomobile* is corrected to *Azospirillum largimobile*.

Keywords: *Skermanella parooensis*, taxonomy, nomenclature, *Conglomeromonas largomobilis* subsp. *parooensis*, *Azospirillum largimobile*

In 1997 Ben Dekhil *et al.* transferred the type species of the genus *Conglomeromonas*, *Conglomeromonas largomobilis* subsp. *largomobilis*, to the genus *Azospirillum* as *Azospirillum largomobile* on the basis of phylogenetic evidence determined by a comparison of 16S rDNA sequences and earlier nucleic acid hybridization studies (Falk *et al.*, 1986). The study by Ben Dekhil *et al.* (1997) also showed that the second subspecies of *Conglomeromonas largomobilis*, *Conglomeromonas largomobilis* subsp. *parooensis*, was more distantly related to *A. largomobile* and the existing species of *Azospirillum* than originally predicted, and is the only known representative on a deep subline of descent within the *Azospirillum* branch of the a subclass of the *Proteobacteria*. On the basis of the phylogenetic evidence and supporting phenotypic characteristics, including the inability to fix dinitrogen, a proposal was made to retain the genus *Conglomeromonas* by elevating the subspecies *C. largomobilis* subsp. *parooensis* to the new type species of *Conglomeromonas* as *Conglomeromonas parooensis* sp. nov. Subsequently it was realized that this action was contrary to Rule 37a(1) of the International Code of Nomenclature of Bacteria (Lapage *et al.*, 1992), whereby the name of the genus must be changed if the nomenclatural type

(*Conglomeromonas largomobilis* subsp. *largomobilis*) is excluded from the genus. Thus the genus *Conglomeromonas* became invalid as a consequence of this action and the proposal to create a new type species for the genus was invalid. Consequently, a new genus is required to accommodate *C. largomobilis* subsp. *parooensis*.

Evidence has been provided in the previous paper by Ben Dekhil *et al.* (1997) to support the inclusion of *C. largomobilis* subsp. *parooensis* in a separate genus and the purpose of this paper is to correct the nomenclatural anomaly caused by the previous proposal. We propose therefore that the subspecies of *C. largomobilis* subsp. *parooensis* be transferred to a new genus, *Skermanella* gen. nov., as *Skermanella parooensis* sp. nov. We also correct the spelling of the specific epithet of *Azospirillum largomobile* to *Azospirillum largimobile* to conform with the neuter gender of the genus in accordance with the recommendation of Appendix 9 of the International Code of Nomenclature of Bacteria (Lapage *et al.*, 1992).

The description given below for *Skermanella* is based on the original description of the genus *Conglomeromonas* by Skerman *et al.* (1983) and includes data

Table 1. Characteristics that differentiate *Skermanella parooensis* gen. nov., sp. nov. from species of *Azospirillum*

Compilation of data from Dobereiner (1992), Khammas *et al.* (1989), Krieg & Dobereiner (1984), Skerman *et al.* (1983) and Ben Dekhil *et al.* (1997). +, Property present; -, property absent; d, property variable between strains; v, test results variable or inconsistent; MP, monopolar flagella; L, lateral flagella; ND, not determined.

Character	<i>S. parooensis</i>	<i>A. largimobile</i>	<i>A. lipoferum</i>	<i>A. brasilense</i>	<i>A. amazonense</i>	<i>A. halo- praeferens</i>	<i>A. irakense</i>
Cell width (µm)	1.0-1.5	0.7-1.5	1.0-1.5	1.0-1.2	0.8-1.0	0.7-1.4	0.6-0.9
Pleomorphic cells	+	+	+	-	+	+	+
Flagellation	MP, L	MP, L	MP, L	MP, L	MP	MP	MP, L
Growth with 3% NaCl	ND	-	-	d	-	+	+
Biotin requirement	-	-	+	-	-	+	-
Acid from:							
Glucose	+	+	+	-	-	-	-
Fructose	-	+	+	-	-	+	-
N ₂ fixation (microaerophilic)	-	+	+	+	+	+	+
Nitrate reduction	+	+	+	+	d	+	d
Denitrification	-	-	+d	+d	-	+	-
Carbon source utilization (API method):							
<i>N</i> -Acetyl-glucosamine	-	+	+	-	v	ND	+
L-Arabinose	+	+	+	v	+	v	+
D-Cellobiose	-	-	-	-	+	ND	+
D-Fructose	+	+	+	+	+	+	v
L-Fucose	v	-	v(+)*	-	+	ND	+
D-Galactose	+	+	+	d	+	-	+
Gentibiose	+	+	-	-	+	ND	+
D-Gluconate	-	-	+(-)*	+	-	ND	-
D-Glucose	+	+	+	d	+	-	+
Glycerol	-	+	+	+	-	+	-
<i>myo</i> -Inositol	-	-	v(+)*	-	+	ND	-
Lactose	-	-	-	-	v	ND	+
D-Lyxose	+	-	-(+)*	-	-	-	-
Maltose	-	-	-	-	+	ND	+
D-Mannitol	+	+	+	-	-	+	-
D-Mannose	+	-	v(+)*	-	+	+	+
L-Rhamnose	+	-	-	-	v	ND	+
D-Ribose	+	+	+	-	+	+	v
D-Sorbitol	-	+	+	-	-	-	-
Sucrose	ND	ND	-	-	+	-	+
D-Trehalose	-	-	-	-	+	ND	+
Aesculin hydrolysis	-	+	+	+	+	+	+
DNA G+C content (mol %)	67	70	69-70	69-71	66-68	68-70	64-67

* Result for type strain (Ben Dekhil *et al.*, 1997).

from Falk *et al.* (1986) and from Ben Dekhil *et al.* (1997).

Description of *Skermanella* gen. nov.

Skermanella (Sker.ma.nel'la. M.L. dim. ending *-ella*; M.L. fem. dim. n. *Skermanella* named after V. B. D. Skerman who first isolated this bacterium, and in honour of his contribution to bacterial systematics).

Gram-negative, non-sporing bacterium, which exhibits unicellular and multicellular phases of growth. Unicellular-phase cells are rod-shaped, with rounded or tapered ends and a straight or slightly curved axis, arranged singularly or in pairs. Motile cells have mixed flagellation, with a single polar flagellum and one or more distinct lateral flagella of different wavelength. Multicellular conglomerates arise from single cells which lose motility, become optically refractile and reproduce by multi-planar septation. Under suitable conditions conglomerates dissociate into single motile cells which produce water-clear colonies in which the sparse number of cells move in a sluggish manner. No filamentous structures are formed and no buds are produced. The bacterium is an obligate chemo-organotroph and a facultative anaerobe. Carbohydrate metabolism is fermentative. Unable to fix dinitrogen under microaerophilic conditions, acetylene reduction in malate-N₂-free medium is negative. This taxon belongs to an isolated subline of descent in the *Azospirillum* branch of the α -*Proteobacteria*. Its nearest phylogenetic relative is *Azospirillum largimobile* (93% rRNA sequence similarity). Characteristics that differentiate *Skermanella* from *Azospirillum* species are given in Table 1. The type species is *Skermanella parooensis* sp. nov.

Description of *Skermanella parooensis* sp. nov.

Skermanella parooensis (pa.roo.en'sis, M.L. fem. (and masc.) adj. *parooensis* belonging/pertaining to the Paroo, referring to the Paroo Channel in southwest Queensland, Australia, the source of the water from which the organism was isolated).

The species has the characteristics of the genus and the following additional characteristics. Cells grown on peptone yeast extract agar are 1.0–1.5 by 1.5 μ m; cells grown on lake water agar are 1.0–1.5 by 2–3 μ m. Cells are noncapsulated. Separated colonies grown on peptone yeast extract agar are always in the conglomerate form. Growth after 72 h of incubation at 28 °C is apricot-coloured, opaque, raised and round with a rough furrowed surface and irregular edge. Conglomerates have a dry appearance, are movable intact and are difficult to emulsify. Confluent growth containing single cells may be mucoid and is easily emulsified. On media containing sodium ions, the colonies are composed almost entirely of one or more conglomerates. Conglomerates are usually the same diameter as the colonies of the unicellular form, but occasionally are larger. Colonies grown on agar

medium which includes Congo red do not develop a scarlet colour.

The optimal growth temperature is 28 °C. Growth occurs on peptone yeast extract agar, 0.1% peptone agar, glucose-ammonium sulfate agar, citrate-ammonium sulfate agar and lakewater agar. Slower growth occurs in the presence of 2% NaCl and is always in the conglomerate form and pale pink in colour. Growth is inhibited by 5% NaCl.

Catalase, oxidase, aminopeptidase, phosphatase, deoxyribonuclease and urease are produced. Nitrate is reduced to nitrite. Citrate and malonate are utilized. Tween 80 is hydrolysed. Aesculin, chitin, alginate, cellulose, gelatin and casein are not hydrolysed. Acid (but no gas) is produced from cellobiose, galactose, glucose, inositol, lactose, mannitol, mannose, melibiose and rhamnose. No acid is produced from adonitol, amygdalin, D-arabinose, arabinol, dextrin, dulcitol, erythritol, ethanol, fructose, glycerol, inulin, maltose, melezitose, raffinose, D-ribose, salicin, sorbitol, L-sorbose, starch, sucrose, trehalose, or xylose. D-Arabinose, L-arabinose, D-fructose, gentibiose, D-galactose, D-glucose, D-lyxose, D-mannitol, D-mannose, melibiose, L-rhamnose, D-ribose and D-xylose are utilized as carbon source (API gallery method), but not *N*-acetylglucosamine, D-cellobiose, D-gluconate, glycerol, inositol, lactose, maltose, D-sorbitol or D-trehalose.

Ageing cells contain poly- β -hydroxybutyrate inclusions. The growth temperature range is 10–37 °C. The G + C content of the DNA of the type strain is 67.2 \pm 0.8 mol% (T_j). The type strain is strain ACM 2042^T (= UQM 2042^T), which was isolated from fresh water.

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