Flexibacter canadensis sp. nov.

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University of Alberta Soil Microbiology strain 9D is a gram-negative, nonflagellated, gliding, white, facultatively anaerobic, non-polysaccharolytic, long, thin rod or filament. The guanine plus cytosine content of the deoxyribonucleic acid of this strain is 37.0 mol%. This strain belongs to the genus *Flexibacter*, but it differs significantly from strains of previously described species. Therefore, it is regarded as belonging to a new species, for which the name *Flexibacter canadensis* is proposed. A culture of the type strain, 9D, has been deposited in the American Type Culture Collection under the number 29591.

The purpose of this paper is to describe the properties of a gliding, non-polysaccharolytic bacterium, strain 9D, and to determine its taxonomic position.

MATERIALS AND METHODS

Bacterial strain. University of Alberta Soil Microbiology (UASM) strain 9D was isolated from soil by F.D. Cook, and a culture of this strain has been deposited in the American Type Culture Collection (ATCC), Rockville, Md., under the number ATCC 29591.

Media and methods. The media and methods used to characterize this organism have been described previously (1,3).

RESULTS

The characteristics of strain 9D are as follows.

Cell morphology. Gram-negative, nonflagellated, flexible, thin rods or filaments measuring 0.3 by 3 to 60 μm (Fig. 1) and showing gliding motility and good spreading ability on many dilute media such as Cook cytophaga agar and skim milk-acetate agar.

Cultural characteristics. Cook cytophaga agar: 5-Day-old colonies are white with a pale blue-green iridescence, irregular with a rough surface and lobate edge, and effuse and transparent with no water-soluble pigment. The Munsell color of the colonies is 2.5 Y 8/2.

Skim milk-acetate agar: 5-Day-old colonies are whitish with a blue-green iridescence, irregular with a rough surface and lobate edge, and effuse and transparent to opaque with no water-soluble pigment. The Munsell color of the colonies is 10 YR 8/2.

Plate count agar: 5-Day-old colonies are very pale pinkish gray with a blue-green iridescence, irregular with a smooth surface and lobate edge, effuse to raised and translucent to opaque with no water-soluble pigment. The Munsell color of the colonies is 2.5 YR 6/3.

The Munsell colors observed on various media are 2.5 YR 6/3, 6 YR 6/4, 7.5 YR 6/4 and 7/2, 10 YR 7-8/2 and 7/3, and 2.5 Y 7-8/2; no water-soluble pigment has ever been observed.

Broth culture: Overnight growth in a shaken culture is silky but not viscous or flocculent; there is no surface ring or pellicle produced.

Fruiting bodies and microcysts are not produced.

Physiology. Growth is reduced by 1% and is inhibited by 2% NaCl; the preferred atmosphere for growth is 10% O_2 ; the temperature range is 10 to 40°C, optimum growth occurring at 18 to 30°C; the pH range for growth is 5 to 10, optimum growth occurring at pH 6 to 8.

NH_4^+ , glutamate, asparaginate, and various proteins and protein digests (e.g., tryptone, Caseitone, gelatin, casein), but not NO_3^- or urea, are utilized as sole N sources.

Growth is stimulated by yeast extract on media containing agar only or chitin and agar only.

Growth is not reduced by 0.01% but is inhibited by 0.1% sodium lauryl sulfate. The organism is susceptible to 30 μg of chloramphenicol, 10 μg of dihydrostreptomycin, 300 U of

FIG. 1. Cells of strain UASM strain 9D.

TABLE 1 Characteristics which distinguish *F. canadensis* from other species of *flexibacters*^a

Species	Habitat	G+C (mol%)	Cell length (μ m)	Colony color	% NaCl for growth		Anaerobic growth	Acid production from:			Hydrolysis of:			NO ₃ ⁻ as N source	Growth factors required	Cata- lase	H ₂ S	NO ₃ ⁻ → NO ₂ ⁻	Suscepti- bility to 0.01% so- dium lauryl sul- fate
					Mini- mum	Maxi- mum		Glu- cose	Su- crose	Glyc- erol	CMC ^b	Starch	Gela- tin						
<i>Flexibacter canadensis</i>	Soil	37.0	3-60	White	0	2.0	+	+	-	+	-	+	+	-	-	+	+	+	-
<i>F. aggregans</i> ^c	Marine	35.7-42.3	100	Yellow	1.25	5.0	-	+	+	±	±	-	-	±	-	-	-	-	+
<i>F. aluminosus</i>	Soil, FW	31.5-32	4-10	White	0	2.5	-	±	±	-	+	±	+	+	-	+	-	-	-
<i>F. aurantiacus</i> ^c	fish		5-20	Yellow- or- ange															
<i>F. aurantiacus</i> subsp. <i>coepodorum</i>	Marine copepod	33	5	Yellow	2.5	2.5	-	-	-	-	-	-	+	-	-	-	-	-	+
<i>F. aurantiacus</i> subsp. <i>exathedrus</i>	FW	34.5	10	Yellow	0	0	-	-	-	-	-	+	+	-	-	-	-	-	+
<i>F. aureus</i>	FW		3-5	White, yel- low- gilt, or- ange															
<i>F. columnaris</i> ^d	FW fish	29.8-35.9	4-8	Yellow	0.5	2.5	-	±	-	-	-	-	+	-	+	+	+	-	+
<i>F. elegans</i>	FW, hot- spring	47.5	20-50	Yellow or- ange	0		-	-	-	-	-	-	+	-	-	-	-	-	
<i>F. flexilis</i>	FW, hot- spring	40.5-43	10-50	Orange	0	0	-	±	+	-	-	±	-	-	+	-	+	-	+
<i>F. flexilis</i> subsp. <i>algavorum</i>	FW	35.9	7-200	Orange			-	-	-	-	-	-	+	-	+	+	+	+	+
<i>F. flexilis</i> subsp. <i>iolanthae</i>	FW	41.3	10-30	Orange	0	0	-	-	-	-	-	-	+	-	-	-	-	-	+
<i>F. flexilis</i> subsp. <i>pelliculosus</i> ^c	FW	39.5	10-30	Orange	0	0	-	+	+	-	+	+	+	+	-	-	+	+	+
<i>F. giganteus</i>	FW	32	100	Pink, or- ange- red															
<i>F. litoralis</i>	Marine, FW	31	180	Red, pink	0	0	-	+	-	-	-	+	+	-	+	-	±	-	+
<i>F. roseolus</i>	Hot- spring	34.5-38	>50	Red	0	5	-	-	-	-	-	-	+	-	+	-	-	-	+
<i>F. ruber</i>	Hot- spring	37	>50	Red	0	0	-	+	+	-	-	+	+	+	+	-	-	+	+

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