NOTES

Spirosomaceae, a New Family to Contain the Genera *Spirosoma* Migula 1894, *Flectobacillus* Larkin et al. 1977, and *Runella* Larkin and Williams 1978

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Spirosomaceae fam. nov. is proposed for the curved, coil- and filament-forming, pigmented, strictly aerobic organisms in the genera *Spirosoma* Migula 1894, *Flectobacillus* Larkin et al. 1977, and *Runella* Larkin and Williams 1978. The type genus is *Spirosoma*.

All known nonmotile, ring-forming bacteria were at one time classified in the genus *Microcycclus* in one of three species: *M. major* Gromov, *M. flavus* Raj, or *M. aquaticus* Ørskov, the type species (10). Several investigators (2, 4, 7, 10), citing the fact that *M. flavus* and *M. major* had little in common with *M. aquaticus* other than the formation of rings, found this arrangement to be unsatisfactory. Moreover, Konopka et al. (4) isolated a motile strain of *M. aquaticus*, and this invalidated the lack of motility as a unifying characteristic of the genus. Larkin et al. (7) divided the genus into three genera, each containing one species: *M. flavus* was placed in the revived genus *Spirosoma* Migula (8) as *S. linguale*; *M. major* was transferred to a newly created genus, *Flectobacillus*, as *F. major*; and *M. aquaticus* remained as the only species in *Microcycclus*. Subsequently, the genus *Runella* (6) was created for isolates that had some features in common with both *Spirosoma* and *Flectobacillus*. Thus, there are at present four genera whose members possess the ability to produce rings. However, *Spirosoma*, *Flectobacillus*, and *Runella* have traits in common which are not shared with *Microcycclus* and which indicate that they belong together in a higher taxon that does not include *Microcycclus*. Among these traits is the ability of the cells to form helical coils and long, sinuous filaments. The cells of *Microcycclus* have been observed to occur singly or in pairs, never in coils or filaments. When grown on MS agar (0.1% each of glucose, peptone, and yeast extract, plus 1.5% agar) (7), cells of the three similar genera produce pigments ranging from the pale yellow of *Spirosoma* to the pale pink shades of *Flectobacillus* and *Runella*. *Microcycclus* colonies are gray to white in color. There is a wide disparity in the guanine-

plus-cytosine (G+C) contents of the deoxyribonucleic acids (DNAs) of the two groups, that of *Microcycclus* (66.3 to 68.4 mol%) being considerably higher than those of the others (2). *Spirosoma* has 51.0 to 52.9 (2, 7, 9), *Runella* has 49.3 to 49.6 (6), and *Flectobacillus* has 38.3 to 40.3 (3, 7) mol% G+C in its DNA. Konopka et al. (4) examined the genetic relatedness between *Microcycclus* and *Spirosoma* by measuring the degree of heteroduplex formation between their DNAs. They found only 0 to 14% binding of the DNAs from three *Spirosoma* strains to that of a strain of *M. aquaticus*. A marine isolate (now *F. marinus* [1]) gave a 0% binding rate.

The three genera of coil- and filament-forming, pigmented bacteria (*Spirosoma*, *Flectobacillus*, and *Runella*) should be grouped together into a family that does not include the genus *Microcycclus*. For this family we propose the name *Spirosomaceae* fam. nov., which is based on the name of the type genus, *Spirosoma* Migula 1894, in accordance with Rule 47a of the *Bacteriological Code* (5).

A description of the family *Spirosomaceae* follows.

Spirosomaceae fam. nov.

(*Spi.ro.so.ma'ce.ae*. M.L. n. *Spirosoma* type genus of the family; -*aceae* ending to denote family; M.L. fem. pl. n. *Spirosomaceae* the *Spirosoma* family.)

Rods, 0.5 to 1.0 μ m in diameter, with various degrees of curvature, sometimes resulting in rings, coils, and undulating filaments. Nonmotile. Resting stages are not known. Gram negative. Colonies contain a pink or yellow, non-water-soluble pigment. Metabolism is respiratory; acids are produced from some carbohydrates. Strictly aerobic. Chemoorganotrophic.

The G+C content of the DNA of those species for which it is known ranges from 38.3 to 52.9 mol% (buoyant density or thermal denaturation). Isolated from soil and from freshwaters.

We do not have any proposal regarding the familial relationships of *M. aquaticus*. Konopka et al. (4) isolated a strain of *M. aquaticus* which is motile by means of a single polar flagellum, and they indicated that this species may be related to the *Pseudomonadaceae*, although they were not able to show any genetic relatedness of their motile strain to *P. aeruginosa*.

REPRINT REQUESTS

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