

NOTES

Rhodospirillum tenue sp. n., a New Species of the Purple Nonsulfur Bacteria

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Received for publication 24 May 1969

Rhodospirillum tenue sp. n. differs from the rhodospirilla described so far by its small size, ultrastructure, and physiological and biochemical characteristics.

Enrichment cultures for purple nonsulfur bacteria were prepared with pelargonate as the only organic carbon source. This compound proved to be a good substrate for the enrichment of the brown *Rhodospirillum* species, *R. fulvum* and *R. molischianum* (1, 3). A small *Rhodospirillum* strain (2761) was obtained in pure culture by using an inoculum from a forest pond near Grünenplan, Germany. Strain 2761 was provisionally designated *R. fulvum* on the basis of its spirilloid morphology and small size. Later studies showed that strain 2761 differs from *R. fulvum* in its ability to grow aerobically in the dark. In addition, electron microscopy revealed a different fine structure of the internal membrane system (W. E. de Boer, *personal communication*). Whereas *R. fulvum* possesses characteristic stacks of lamellar membranes carrying the photopigments, strain 2761 does not show any particular membrane system in addition to the cytoplasmic membrane, except for occasional tubular or fingerlike intrusions of the type characteristic of *R. gelatinosa* (4; W. E. de Boer, *unpublished results*).

Cultures of strain 2761 are brownish-red in color; the cells tend to form clumps and a sticky sediment. The nutrition of the strain differs from *R. fulvum* (2). Strain 2761 grows with lactate, arginine, and Casamino Acids, but ethyl alcohol, benzoate, and cyclohexane carboxylate are not metabolized. The width of the cells of strain 2761 is only about 0.4 μm , some two-thirds of the width of the cells of *R. fulvum*; this makes strain 2761 the most slender of the phototrophic nonsulfur bacteria at present in pure culture (Fig. 1).

The above-mentioned differences from *R. fulvum* justify the recognition of strain 2761 as a new species of the genus *Rhodospirillum*.

Rhodospirillum tenue sp. n.

te'nu.e. L. adj. *tenuis* thin.

Morphology: Cells weakly curved in a spiral of

one to two complete turns. Width of the cells, 0.3 to 0.5 μm ; length, 3.0 to 6.0 μm ; width of a spiral, 0.8 to 1.0 μm . Multiplication by binary fission. Cells highly motile by means of polar flagella. Gram-negative. In addition to the cytoplasmic membrane, only occasional fingerlike membranous intrusions are present, similar to those of *Rhodopseudomonas gelatinosa*.

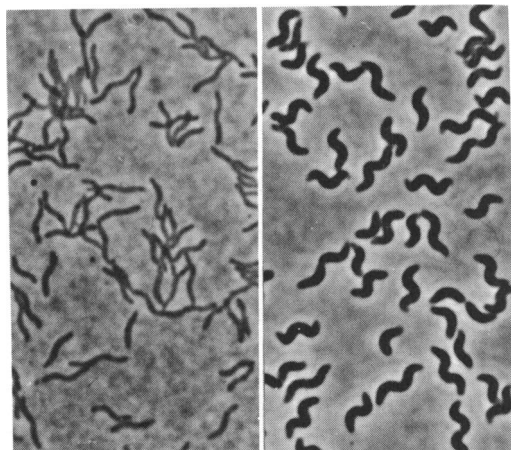


FIG. 1. Cell form of *Rhodospirillum tenue* strain 2761 (left) compared with *Rhodospirillum fulvum* strain 3060 (right). Both strains acetate-grown. Phase contrast. $\times 1,700$.

Culture: Photolithotrophic (with molecular hydrogen) and facultatively photoorganotrophic. Growth occurs either anaerobically in the light or under microaerophilic to aerobic conditions in the dark. Optimum pH 7.4. Grows well at 30 C. Color of anaerobic cultures brownish-red; aerobically grown cells colorless to pale red. No growth factors required. Growth rate increased in the pres-

ence of complex organic nutrients or yeast extract. Cells tend to form clumps and a sticky sediment under all conditions. Photoassimilation of single organic substrates: fumarate, malate, succinate, pyruvate, lactate, acetate, butyrate, valerate, caprylate, propionate, caproate, pelargonate, arginine. Casamino Acids also photoassimilated. Growth inhibited by: sulfide, formate, methanol, glycolate, aspartate, fructose, benzoate, and cyclohexane carboxylate.

Pigments: Absorption spectra of living cell suspensions show the maxima of bacteriochlorophyll *a*-containing organisms at 375, 593, 805, and 877 nm, and carotenoid maxima at 465, 495, and 530 nm. Carotenoids are of the normal spirilloxanthin series.

Hydrogenase and catalase activity present.

DNA-base composition: 64.8 moles per cent guanine plus cytosine.

Source: Muddy freshwater pond, Grünenplan, Germany.

Holotype: Strain 2761 (Grünenplan). Type cultures are deposited with the American Type Culture Collection (ATCC 25093) and the culture collection of the Institut für Mikrobiologie der Universität Göttingen, Germany (strain 2761).

The DNA base ratio determination was kindly provided by Manley Mandel, Anderson Hospital and Tumor Institute, Houston, Tex.

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