**Saccharomonospora cyanea sp. nov.**

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A new species of *Saccharomonospora* Nonomura and Ohara 1971 is described, for which the name *Saccharomonospora cyanea* is proposed. This organism is characterized by dark blue aerial mycelium and single spores mainly on aerial mycelia. The type strain of *S. cyanea* is strain NA-134 (= SIIA 86134 = ATCC 43724).

During the course of screening for new antibiotics, we isolated an actinomycete designated strain NA-134T (T = type strain). This strain belongs to the genus *Saccharomonospora* Nonomura and Ohara 1971 (5) because of its morphological features and cell wall composition. In this paper we describe the morphological and physiological properties of this strain and propose the name *Saccharomonospora cyanea* sp. nov.

**Bacterial strain.** Strain NA-134T was isolated in our laboratory from soil samples collected at Guangyuan, Sichuan, China.

**Morphological characteristics.** Morphological observations were made with a light microscope on cultures grown at 28°C for 2 to 4 weeks on oatmeal agar (ISP medium 3) (8). Spore morphology was studied with a scanning electron microscope (model S-450; Hitachi).

**Cultural and physiological characteristics.** The media used for cultural and physiological characterization of strain NA-134T were the media described by Shirling and Gottlieb (8) and Waksman (9). Each culture was incubated at 28°C for 2 to 4 weeks. The temperature range for growth was determined on oatmeal agar (ISP medium 3). Carbohydrate utilization was investigated by using the procedure of Shirling and Gottlieb (8) with a basal mineral salts agar (CM medium) (4). A cell wall analysis was performed by using the method of Becker et al. (1), and a whole-cell analysis was performed by using the method of Lechevalier (3).

**Morphological characteristics.** The vegetative mycelium of strain NA-134T was fine, 0.2 to 0.4 μm in diameter, long, and irregularly branched. Fragmentation of hyphae usually did not occur either on agar or under submerged conditions. The aerial mycelium branched monopodially and was 0.3 to 0.6 μm in diameter. Sessile spores formed singly on aerial hyphae and to a limited extent on the substrate mycelium. The single spores were borne in dense clusters on repeatedly branched sporophores (cluster type). The spores were small and oval to ellipsoidal, (0.8 to 1.0 by 1.0 to 1.8 μm) with warty surfaces (Fig. 1).

**Cultural characteristics.** The cultural characteristics of strain NA-134T are summarized in Table 1. The colors of the mature aerial mycelia and spores produced on oatmeal agar, inorganic salts-starch agar, and nutrient agar belonged to the blue color series (XII₁₃₃ to XII₄₄₅; blue to dark blue [2]). The undersides of colonies were blue to dark blue.

**Physiological characteristics.** The physiological characteristics of strain NA-134T are given below. Gelatin liquefaction...
and milk peptonization were positive. Formation of a melanoid pigment on peptone-yeast extract-iron agar and in tryptone-yeast extract broth was negative. Strain NA-134 grew in media containing sodium chloride concentrations up to 10%, but 15% sodium chloride was inhibitory. The temperature range for growth was 24 to 40°C, with best growth occurring between 28 and 37°C. The carbohydrates D-fructose, mannose, L-rhamnose, ribose, D-xylene, sucrose, maltose, lactose, galactose, trehalose, glycerol, and raffinose produced good growth when the organism was tested in CM basal medium. No growth was observed with L-arabinose, i-inositol, D-mannitol, melibiose, or D-glucose.

**Chemical analysis of cells.** Cell wall hydrolysates of strain NA-134 contained meso-diaminopimelic acid. The L-L isomer was not detected. Sugar determinations indicated that galactose and arabinose were present. These data indicate that strain NA-134 has type IV cell walls and a type A whole-cell sugar pattern.

**Identity of strain NA-134.** The formation of single spores mainly on aerial mycelia and type IV cell walls place strain NA-134 in the genus *Saccharomonospora*. Two species, *Saccharomonospora viridis* (5, 7) and *Saccharomonospora azurea* (6), have been described previously as species of the genus *Saccharomonospora*. When we compared the characteristics of strain NA-134 with the descriptions of previously known species of *Saccharomonospora*, this strain most closely resembled *Saccharomonospora azurea* Hu (6). Therefore, a culture of the type strain of *Saccharomonospora azurea* (strain SIIA 86128) was used for comparison in this study. Several characteristics of strain NA-134 and *Saccharomonospora azurea* SIIA 86128 were compared. On ISP medium 4 and potato extract agar, colonies of strain NA-134 were dark blue, whereas colonies of *Saccharomonospora azurea* SIIA 86128 were colorless. On ISP medium 4, ISP medium 5, ISP medium 7, nutrient agar, calcium malate agar, and potato extract agar the aerial masses of strain NA-134 were light blue to dark blue, whereas the aerial masses of *Saccharomonospora azurea* SIIA 86128 were white. In carbohydrate utilization tests *Saccharomonospora azurea* SIIA 86128 but not strain NA-134 utilized glucose and melibiose. Strain NA-134 grew in media containing NaCl concentrations up to 10%, whereas *Saccharomonospora azurea* SIIA 86128 grew in the same media containing NaCl concentrations up to 7%. In addition, the spore surfaces of strain NA-134 were warty and single spores were borne in dense clusters on repeatedly branched sporophores, whereas *Saccharomonospora azurea* SIIA 86128 spores were smooth and single spores were born well dispersed throughout the mycelium (open type). Therefore, we regard strain NA-134 as a new species, for which we propose the name *Saccharomonospora cyanea* (cy.an'e.a. N.L. adj. cyanea, dark blue, referring to the color of the aerial mycelium). Strain NA-134 is the type strain of *Saccharomonospora cyanea*. A culture of this strain has been deposited in the Antibiotic Culture Collection, Chengdu, People’s Republic of China, as strain SIIA 86134.

**Summary description of *Saccharomonospora cyanea* sp. nov.** Aerobic actinomycete. Substrate mycelium nonfragmented. No sporangium. Single spores borne mainly on aerial mycelium. Spores oval to ellipsoidal, 0.8 to 1.0 by 1.8 μm. Sporophores very short or sessile. Spore surfaces are warty. The color of the aerial mycelium is light blue to dark blue on oatmeal agar, glycerol-asparagine agar, inorganic salts-starch agar, tyrosine agar, nutrient agar, calcium malate agar, potato extract agar, and Czapek sucrose agar. No distinct soluble pigment is formed. Utilizes D-fructose, mannose, L-rhamnose, ribose, D-xylene, sucrose, lactose, trehalose, glycerol, and raffinose, but not L-arabinose, i-inositol, D-mannitol, melibiose, or D-glucose. Cell wall type IV. Mesophilic. Habitat: soil.

**Antagonistic properties.** No antibiotic activity was found by using the agar block method and *Staphylococcus aureus*, *Escherichia coli*, and *Bacillus subtilis* as test organisms. The type strain is strain NA-134 (= SIIA 86134 = ATCC 43724).

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**LITERATURE CITED**


