New Genus of the Actinomycetales: Streptoalloteichus hindustanus
gen. nov., nom. rev.; sp. nov., nom. rev.
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Streptoalloteichus hindustanus was originally described in 1978 as a genus and species of the family
Actinoplanaceae. However, the taxonomic position of this organism should be transferred to a taxon that
includes the genera Nocardiosis, Actinosynnema, and Saccharothrix, based on the lowering of the taxonomic
significance of sporangiumlike vesicles bearing flagellate spores and on a cell chemistry profile comprising the
following: cell wall type III; a whole-cell sugar composition that is a variant of pattern C (presence of galactose,
mannose, and rhamnose); menaquinones MK9(H8) and MK10(H8) as the major menaquinones; and phospho-
lipid type P-II (presence of phosphatidylethanolamine). Chemotaxonomically, this organism is related to
Saccharothrix australiensis, while it is differentiated by its Streptomyces-type morphology; i.e., spore chain
formation at the tip of aerial hyphae, formation of two distinct types of spore chains, lack of mycelial
fragmentation, and the capricious formation of sporangiumlike vesicles bearing flagellate spores. The type
strain is C677-91T (ATCC 31217).

The genus Streptoalloteichus with the specific epithet hindustanus was described originally in 1978 (13), but the
organism does not appear on the Approved Lists of Bacterial Names. The major characteristics of the organism
were summarized by Goodfellow and Cross (2), based on the previous description (13). Subsequently, the taxonomy of
aerobic soil actinornycetes has substantially changed on the basis of extensive chemotaxonomic studies, and new genera
and reclassifications have been proposed. Considering the transition of actinomycete taxonomy as well as our subse-
quent studies in Streptoalloteichus, we now present a revised description of this taxon.

Up to now, spore chain-forming taxa of actinornycetes have been divided into groups with cell wall chemotypes I,
II, III, and IV and presently include at least 15 genera. The wall chemotype III taxa can be further divided into two
groups based on the distribution of the whole-cell sugar madurose. In this paper, we report on the cell chemistry and
morphology of the genus Streptoalloteichus. Subsequently, the taxonomic position of the genus is clarified in compar-
ison with five relevant genera: Streptomyces, Actinomadura, Actinosynnema (3), Nocardiosis (9), and Saccharothrix (7).

MATERIALS AND METHODS

Bacterial strains and cultural conditions. Strain C677-91
was isolated from a soil sample collected in Siddapur,
Gujarat State, India. The strain was obtained from a plate of
Bucto-Nutrient agar (Difco Laboratories) (supplemented
with butirosin at 50 μg/ml) which was incubated at 43°C for
3 weeks. Type strain C677-91 and many additional strains
classified into this species were found to produce tal-
lysomycins A and B (4, 5) along with nebramycin factors II,
IV', and V' (13). Stock cultures were grown on yeast
extract-malt extract agar (ISP medium no. 2) or on glycerol-
asparagine agar (ISP medium no. 5). The other media used in
this study were those recommended for use in the Interna-
tional Streptomyces Project (11) and included inorganic
salts-starch agar, peptone-yeast extract-iron agar, and tyro-
sine agar.

Physiological tests. The tyrosinase test was that of Mikami
et al. (10). Utilization of carbohydrates was examined by the
methods of Shirling and Gottlieb (11).

Cell chemistry. Methods of analysis for the cell wall amino
acids and whole-cell sugars are as described by Tomita et al.
(13). Phospholipid composition was determined by the
method of Lechevalier et al. (8). Menaquinones were pre-
pared and analyzed by the procedures of Collins et al. (1).

RESULTS

Description of Streptoalloteichus gen. nov. Streptoal-
loleichus (Strep'to all'o tei'chus. Gr. adj. str"ep'tos, bent,
turned; Gr. adj. allo's, different; Gr. n. tei'chos, wall; M.L.
masc. n. Streptoalloteichus, streptomycete with different
wall) strains are aerobic, gram-positive, non-acid-fast, fila-
mentous organisms that form from a mycelium differentiated
into a substrate mycelium that penetrates the agar and forms
a compact layer on top of the agar, and an aerial mycelium
originating from the substrate mycelium. The aerial
mycelium forms chains of arthrospores at the hyphal tips and
branched sporophores. The substrate mycelium is not frag-
mented into short filaments or rods, and capriciously bears
small sporangium-like vesicles enveloping one spore or a
single row of two to four spores. The spores have a single
polar flagellum.

The cell wall is type III (meso-diaminopimelic acid as the
diamino acid of the wall peptidoglycan and lacking any
characteristic sugars). The whole-cell sugar pattern is a
variant of type C (D-galactose, D-mannose, and L-
rhamnose). The phospholipids are type P-II (presence of phosphatidylethanolamine as nitrogenous phospholipid). The menaqui-
rones contain both MK-9 (H8) and MK-10 (H8) as the major components.
The type species is Streptoalloteichus hindustanus. The
type strain is C677-91T (ATCC 31217).

Description of Streptoalloteichus hindustanus sp. nov. Strep-
toalloteichus hindu'stanus (hin'du st'an'us. L. adj. of
Hindustan, northwest district of India).

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The genus *Streptomyces* has some similarity to *Streptomyces*, *Actinomadura*, *Nocardiosis* (9), *Actinosynnema* (3), and *Saccharothrix* (7). However, *Streptomyces* is characterized by wall chemotype I (L-lydiaminopimelic acid as the diamin acid of peptidoglycan) and the presence of only MK9 analogs as the major menaquinone, and hence differs. *Actinomadura* is characterized by whole-cell sugar pattern B (presence of madurose), phospholipid type PI (absence of nitrogenous phospholipids), and the presence of only MK9 analogs as the major menaquinones. These chemotypes are inconsistent with those of *Streptoloateichus*. *Nocardiosis* is represented by two species: *N. dassonvillei* has a type PI11 phospholipid pattern (presence of phosphatidylethanolamine), and *N. mutabilis* (12) has MK9(H4) as the major menaquinone. Hence, both species of *Nocardiosis* are distinguished from this genus. *Actinosynnema* (3) is different in morphology (i.e., spore chains are formed on a coremium, and the spores are motile with flagella). Chemotaxonomically, *Saccharothrix* is more closely related to *Streptoloateichus* than the other taxa, but evident differences between the taxa exist in spore chain morphology; i.e., *Streptoloateichus* bears individually two types of spore chains, long spiral and short branching, and both spore chains are formed at the tips of aerial hyphae, whereas *Saccharothrix* forms the spore chains in the total aerial and substrate mycelia. The spore chain morphology of *Saccharothrix* is closely related to that of *Nocardiosis* but is clearly different from those of *Streptoloateichus* and *Streptomyces*. In addition, *Saccharothrix* does not have rhamnose in the whole-cell sugar and lacks the ability to growth on ISP medium no. 9 with any carbon sources. A comparison of *Streptoloateichus* with the five relevant genera is shown in Table 1.

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### LITERATURE CITED


