NEW NAMES AND NEW COMBINATIONS IN THE ORDER ACTINOMYCETALES

B. Lecheva, 1917

FRIDHAM, T. G.
START

MICROCOPY RESOLUTION TEST CHART
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NEW NAMES AND NEW COMBINATIONS
IN THE ORDER ACTINOMYCETALES
BUCHANAN 1917

By T. G. Pridham

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Preface

This study was made as part of the investigations being conducted at the Northern Regional Research Laboratory, Peoria, Ill., on industrial utilization of cereal grains and oilseed crops. The ARS Culture Collection maintained there is one of the world's largest and most complete collections of industrially important bacteria, molds, actinomycetes, and yeasts. This collection serves as a source of authentic micro-organisms for the fermentative production of organic acids, vitamins, antibiotics, enzymes, feeds, beverages, and foods.
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NEW NAMES AND NEW COMBINATIONS
IN THE ORDER ACTINOMYCETALES
BUCHANAN 1917

By T. G. PRIDHAM, Northern Regional Research Laboratory, Agricultural Research Service

During the 1960's many newly proposed names for organisms that would be placed in the order Actinomycetales Buchanan 1917 have appeared in the scientific, quasi-scientific, and patent literature. During this decade several noteworthy developments also have occurred in taxonomy of the genera and species within the order. The most important of these include (1) more objective evaluation of the morphology, excluding so-called colonial or cultural morphology, of these microorganisms; (2) elimination of some old criteria and adoption of some new ones in evaluating taxa; and (3) advances in knowledge with respect to cell wall composition.

These developments have led to proposals of names for many new genera, allowed more rational comparisons of strains, and helped answer many questions. Knowledge of cell wall composition—even in its simplest form—has contributed much in confirming earlier nomenclatural actions and in allowing better correlations of characteristics with taxa.

The following contributions have given us a clearer insight into the nature of the order Actinomycetales and the relationships of its families, genera, species, subspecies, and strains:

(1) Real beginnings of recognition that micromorphology might assume a dominant role in the taxonomy of the Actinomycetales (Waksman and Curtis 1916; Ørskov 1923; Krasil’nikov 1938, 1941). 1

(2) Most important proposal of the genus Streptomyces (Waksman and Henrici 1943).

(3) Almost simultaneous critical evaluation of micromorphology of the streptomycetes and its application to practical taxonomy by three widely separated research groups (Gauze et al. 1957; Ettlinger et al. 1958; Pridham et al. 1958).

(4) Discovery and placement in the order Actinomycetales of the genus Actinoplanes (Couch 1950)—the prelude to discovery and characterization of a host of proposed new genera by many investigators.

1 The year after the author's name is the key to the reference in Literature Cited. p. 46.
Proposition that production of antibiotics by certain members of the Actinomycetales represents a species determinant (Krasil'nikov 1951, 1956, 1958).

Research on cell wall composition of the Actinomycetales (Work 1949; Lechevalier and Lechevalier 1967).

Development of an excellent chemistry background by antibiotic researchers in isolating, characterizing, and identifying many unique compounds produced by certain strains of the Actinomycetales since discovery of actinomycin.

Accompanying these advances has been improvement in recognizing various syndromes associated with the pathogenicity of certain Actinomycetales in the human and nonhuman animal. This point of considerable import in the early history of taxonomy of these microorganisms has been often overlooked by taxonomists. It is the cause undoubtedly of much of the current confusion and disagreement on the nature of the genera *Actinomyces* Harz 1877 and *Streptomyces* Waksman and Henrici 1943 (Kalakutskii 1963; Krasil'nikov 1963; Waksman 1964).

Waksman and Henrici (1943) made a most noteworthy contribution in proposing and describing the genus *Streptomyces*. Their proposal clarified the Actinomycetales problem by separating out from a heterogeneous group of different forms a more rational and scientifically acceptable taxon. Arguments now that Waksman and Henrici's proposal was not correct seem to be ill-advised, especially when one considers the genus *Actinomyces* Harz 1877. The proposal of the name *Actinomyces bovis* Harz 1877 was based on studies of the clinical syndrome of bovine lumpy jaw or bovine actinomycosis.

Whether Harz or subsequent workers were studying the actual causative agent really does not matter. Perusal of the literature contemporary to Harz's time strongly suggests that both inadequate microbiology and inadequate veterinary and medical diagnostics had an important role in establishing the confused basis on which the Actinomycetales taxonomy was built.

The clinical condition of actinomycosis is caused by infection with anaerobic to microaerophilic Actinomycetales—clearly different in many characteristics from streptomycetes, nocardiae, or any of the other genera in the order. A noteworthy finding relates to the presence of lysine and absence of diaminopimelic acid in the cell walls of true actinomycetes (anaerobic to microaerophilic forms). I have no doubt that if the clinical condition of actinomycosis and other related syndromes could be assessed in more precise terms, further confirmation of this point would be made.

Certain aerobic Actinomycetales, e.g., nocardiae, are capable of evoking clinical symptoms (mycetomata) that now have no real clinical relation to true actinomycosis. Nonprecise diagnoses and limited microbiol-
New Names and New Combinations in Actinomycetales

ogy in the early days contributed to present-day confusion with reference to nocardioses, streptothricoses, actinomycesis, and other syndromes associated with the Actinomycetales.

Therefore no useful purpose seems to be served in lumping together such a heterogeneous group of organisms into the genus Actinomyces as Krasil'nikov has done. Present scientific evidence points out that Actinomyces Harz 1877, Nocardia Trevisan 1889, Streptomyces Waksman and Henrici 1943, and Streptoverticillium Baldacci 1958 represent the best and most accurate contemporary categories for these organisms, exclusive of many other new genera proposed.

Accordingly new names and new combinations are proposed here to show more accurately the true nature of these organisms cited in the contemporary scientific and quasi-scientific literature since 1957.

In this bulletin the genus Chainia Thirumalachar 1955, 935, is placed in putative synonymy with Streptomyces Waksman and Henrici 1943, 339, based on study of the type strains of the type species of each genus and discussion and correspondence with a number of specialists.

Despite the fact that many "contemporary" organisms, mostly streptomycetes, carry newly proposed names and are now or may in the future be available for laboratory study, nomenclaturally they are "in limbo" (Rule 11, "International Code of Nomenclature of Bacteria," Editorial Board 1966). Many of the names and descriptions occur in the patent literature. Responsibility, of course, for valid publication of names occurring only in patents or the quasi-scientific literature, e.g., abstracts and unpublished master's or doctoral theses, rests with the researchers and taxonomists (sometimes their companies) who made the characterization studies and coined the names. These individuals may not even be listed as authors. The names of micro-organisms should be published in accordance with present rules and regulations governing their naming. So far as such publications as "Bergey's Manual of Determinative Bacteriology" are concerned, there is a definite need to get these "in-limbo" names into the mainstream of scientific literature where they belong.

The format used here is suggested for future descriptions of newly proposed taxa in the order Actinomycetales Buchanan 1917. It provides necessary information and clarifies elements that are missing in many published descriptions of newly proposed taxa. Designation of the type strains and also syllabifications and etymologies of specific and subspecific epithets are often absent or presented in a confusing manner in virtually all the original descriptions cited. Likewise, clear indications of the authorities for particular names are missing. In publications authored by three to eight or more persons, obviously not all of them were involved in the taxonomic work or in coining the proposed new name.

This bulletin includes new names and new combinations proposed through June 1967. "Index Bergeyana" (Buchanan et al. 1966) and its
two supplements (Hatt and Zvirbulis 1967; Zvirbulis and Hatt 1969), as well as many other sources of information, were used in this study.

In the etymologies of the specific and subspecific epithets, an effort has been made to syllabize, accent, and define the combinations of letters as reasonably as possible.

R. E. Buchanan, Iowa State University, Ames, E. B. Shirling, Ohio Wesleyan University, Delaware, and John Coats and Miss Alma Dietz, The Upjohn Company, Kalamazoo, Mich., have given valuable criticisms and comments.

The following abbreviations are used in this bulletin:

ATCC—American Type Culture Collection, Rockville, Md., U.S.A.
Bristol Labs.—Bristol Laboratories, Inc., Syracuse, N.Y., U.S.A.
CBS—Centraalbureau voor Schimmelcultures, Baarn, Netherlands
CMII—The Commonwealth Mycological Institute, Kew, Surrey, England
ČSAV—Institute of Biology of the Academy of Sciences, Prague, Czechoslovakia
FBUA—Institute of Soil Research and Agrochemistry, Hungarian Academy of Sciences, Budapest
HACC—Hindustan Antibiotics Culture Collection, Pimpri near Poona, India
HCIO—Herbarium Cryptogamie Indiae Orientalis, Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, New Delhi, India
IAM—Institute of Applied Microbiology, University of Tokyo, Tokyo, Japan
IMASP—Institute of Microbiology, Academy of Science, Peking, China
IMRU—Institute of Microbiology, Rutgers University, New Brunswick, N.J., U.S.A.
INA—Institute for Research of New Antibiotics, Academy of Medical Sciences, U.S.S.R., Moscow
INMI—Institute of Microbiology, Academy of Sciences, U.S.S.R., Moscow
Lederle—Lederle Laboratories, Pearl River, N.Y., U.S.A.
LIA—Museum of Cultures of Leningrad Research Institute of Antibiotics, Leningrad, U.S.S.R.
Lilly—Eli Lilly and Company, Indianapolis, Ind., U.S.A.
NRRI—Northern Regional Research Laboratory, Peoria, Ill., U.S.A.
OEU—Osaka University of Liberal Arts and Education, Osaka, Japan
RIA—The U.S.S.R. Research Institute for Antibiotics, Moscow

Gr.—Greek, actually Latinized Greek
L.—Classic, or in some cases postclassic, Latin and found in an unabridged Latin dictionary
Low L.—Low Latin. Equivalent to Medieval Latin
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Based on Names First Proposed in
Russian Literature

*Streptomyces albohelvatus* (Krasil'nikov, Korenyako, and Nikitina in Krasil'nikov (ed.) 1965) comb. nov.

**Type strain:** (None by original designation); INMI 1349 by subsequent designation by Krasil'nikov for the International Streptomyces Project.

**Synonymy:** *Actinomyces albohelvatus* Krasil'nikov, Korenyako, and Nikitina in Krasil'nikov (ed.) 1965, 224.

**Etymology:** *albohelvatus* L. adj. albus, white; L. adj. helvatus, honey yellow; M.L. adj. albohelvatus, light honey yellow.

*Streptomyces albus* (Rossi Doria 1891) Waksman and Henrici 1943 subsp. *aromaticus* (Krasil'nikov 1941) comb. nov.

**Type strain:** None designated of four discussed, none of which are extant. Subspecies is so named because the original cultures were reported to exude a fruity or pearlike odor, the only reason for recognizing this taxon.
Synonymy: *Actinomyces albus* (Rossi Doria) Gasperini (1892) (sic) subsp. *aromaticus* Krasil’nikov 1941, 40; or *Actinomyces aromaticus* n. subsp. (sic) Krasil’nikov 1941, 40 (Eng. transl. 1968, 45); or *Streptomyces aromaticus* (Krasil’nikov 1941) Pridham, Hesseltine, and Benedict 1958, 68 (a lapsus calami); or *Streptomyces albus* subsp. *aromaticus* (Krasil’nikov) Pridham, Hesseltine, and Benedict 1958, 68 (a lapsus calami) (sic) in Buchanan, Holt, and Leslue 1966, 1094.


*Streptomyces albus* (Rossi Doria 1891) Waksman and Henrici 1943 subsp. *bruneomycini* (Kudrina, Olkhovatova, Murav’yeva, and Gauze 1966) comb. nov.

Type strain: INA 471/63 (single isolate).


*Streptomyces albus* (Rossi Doria 1891) Waksman and Henrici 1943 subsp. *fungatus* (Solovyeva and Rudaya 1959) comb. nov.

Type strain: INA 604-36 (single isolate).

Synonymy: *Actinomyces albus* var. *fungatus* nov. sp. (sic) Solovyeva, Rudaya, Biekova, and Ginsburg 1959, 189 (not validly pub.).

*Actinomyces albus* var. *fungatus* Solovyeva and Rudaya 1959, 8 (Eng. transl. 1959, 662).


*Streptomyces albus* (Rossi Doria 1891) Waksman and Henrici 1943 subsp. *odoratus* (Krasil’nikov 1941) comb. nov.

Type strain: None designated of two discussed, neither of which is extant. Subspecies is so named because original cultures were reported to exude a characteristic camphorlike odor, the only reason for recognizing this taxon.
Synonymy: *Actinomyces odoratus* n. subsp. (sic) Krasi\'n\'ikov 1941, 40 (Eng. transl. 1966, 45); or *Streptomyces odoratus* (Krasi\'n\'ikov 1941) Fridham, Hesseltine, and Benedict 1958, 71 (based on incomplete and inadequate translation of Krasi\'n\'ikov's original 1941 monograph); or *Actinomyces albus* subsp. *odoratus* Krasi\'n\'ikov 1941, 40, in Buchanan, Holt, and Lessel 1966, 28.

Etymology: *al'bus* subsp. *odoratus* L. adj. *albus*, white; L. adj. *odoratus*, with sweet odor; M.L. *albus* subsp. *odoratus*, the sweet-smelling subspecies of the white streptomycete, but obviously referring to the camphorlike odor exuded by the organism.

*Streptomyces alma-ataensis* (Novogrudsky 1950) comb. nov.

**Type strain:** None designated of three discussed.

**Synonymy:** *Actinomyces alma-ataensis* Novogrudsky 1950, 14–25.

**Etymology:** *al'ma-a.ta.en'sis* M.L. adj. *alma-ataensis*, pertaining to Alma-Ata, a city in the Kazakhstan S.S.R. in central Asia.

**Remarks:** This taxon is discussed in length in Krasi\'n\'ikov (1965) and Fridham, Lyons, and Seckinger (1965).

*Streptomyces anthocyaneus* (Vetlugina and Shigayeva 1959) comb. nov.

**Type strain:** None designated of several described.

**Synonymy:** *Actinomyces anthocyaneus* (*anthocyaneus*) Vetlugina and Shigayeva 1959, 46–54.

**Etymology:** *an.tho.cy.an'e.us* Gr. n. *anthos*, flower; Gr. adj. *cyaniceps*, dark blue; M.L. adj. *anthocyaneus*, dark-blue flower, but probably based on the word "anthocyanin," a soluble, pH-sensitive pigment imparting reddish or purplish colors to flowers and plants.

**Remarks:** The taxon is further discussed in Krasi\'n\'ikov (1965). The authority for the name *Actinomyces anthocyaneus* may be Novogrudsky (1950). Efforts to obtain a copy of his paper have been unsuccessful.

*Streptomyces anthocyaneus* (Krasi\'n\'ikov, Sorokina, Alferova, and Bezzubenkova in Krasi\'n\'ikov (ed.) 1965) comb. nov.

**Type strain:** (None by original designation); INMI 69 = ATCC 1982 by deposit and subsequent designation by Krasi\'n\'ikov for the International Streptomyces Project.

**Synonymy:** *Actinomyces anthocyaneus* Krasi\'n\'ikov, Sorokina, Alferova, and Bezzubenkova in Krasi\'n\'ikov (ed.) 1965, 118.

**Etymology:** *an.tho.cy.an'i.e.us* Gr. n. *anthos*, flower; presumably based on Gr. adj. *cyaniceps*, dark blue; M.L. adj. *anthocyaneus*, presumably referring to resemblance to dark blue or to similarity between the pH-sensitive pigment produced by this species and the pigment anthocyanin produced in plants.
Streptomyces ashchabadicus (Preobrazhenskaya 1966) comb. nov.
Type strain: INA 13496 (single isolate).
Etymology: ash.ca.ba.dic'i.cus M.L. adj. ashchabadicus, belonging to Ashkhabad, a city of the Turkoman Republic of central Asia.

Type strain: INA 4305 (single isolate).
Etymology: at.ro.o.li.va'ce.us subsp. nu.to.my.cin'i L. adj ater, black; L.n. oliva, olive; M.L. adj. olivaceus, olive colored; M.L. adj. atroolivaceus, black olive colored; L.t.v. mut'o, shift, change, alter; M.L. suf. -mycin, used for many antibiotic names; M.L. gen. n. mutomycini, of mutomycin; M.L. atroolivaceus subsp. mutomycini, referring to the mutomycin-producing subspecies of the black olive-colored streptomycete.

Streptomyces aureocircularatus (Krasil'nikov and Yuan in Krasil'nikov (ed.) 1965) comb. nov.
Type strain: INMII 735 (single isolate).
Actinomyces aureocircularatus Krasil'nikov and Yuan in Krasil'nikov (ed.) 1965, 33.
Etymology: au.re.o.ci.ruc.ula'tus L. neut. n. aurum, gold; L. part. adj. circularatus, curved; M.L. adj. aureocircularus, golden curved.

Streptomyces aureomonopodiales (Krasil'nikov and Yuan in Krasil'nikov (ed.) 1965) comb. nov.
Type strain: INMII 5008 by original designation.
Etymology: au.re.o.mo.no.po.di.a'les L. neut. n. aurum, gold; Gr. n. monopodios, table with one foot (successive lateral branches or axes from main or primary axial stem); M.L. adj. aureomonopodiales, golden monopodial, probably intended to refer to the mode of branching of aerial mycelium of a golden-yellow pigmented organism.
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Remarks: Strain INMI 5008 originally was named *Actinomyces longissimus ramosus* (sic) by Yuan in Konova (1962). This name was not validly published. Subsequently strain INMI 5008 was named *Actinomyces aureomonopodiales*.

**Streptomyces aureovericillatus** (Krasil’nikov and Yuan 1960) comb. nov.

Type strain: INMI 1077 = ATCC 15854 = ATCC 19726 (single isolate).


Etymology: *aureovericillatus* L. neut. n. aurum, gold; L. mas. n. verticillus, whorl; M.L. adj. verticillatus, whorled; M.L. adj. aureovericillatus, golden whorled.

Remarks: This taxon is not whorled in the sense of the whorls of the genus *Streptovericillium* Baldacci 1958.

**Streptomyces auriginens** (Krasil’nikov, Korenyako, and Nikitina in Krasil’nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 2375 = ATCC 19827 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.


Etymology: *auriginens* L. adj. aurigineus, yellowish.

**Streptomyces bacillaris** (Krasil’nikov 1958) comb. nov.

Type strain: (None by original designation); INMI 445 = ATCC 15855 by deposit in an internationally recognized culture collection.

Synonymy: *Actinomyces bacillaris* Nikitina 1957, according to Kostachev 1958, 142. Not validly published.

*Actinomyces bacillaris* Krasil’nikov 1958, 258. Krasil’nikov comments that the species is described in another paper (not verified).

*Actinomyces bacillaria* (sic) Nikitina 1957 in Buchanan, Holt, and Lessel 1966, 30, a lapsus calami. This name is not found in the abstract by Kostachev previously mentioned.

*Actinomyces bacillus* (sic) Krasil’nikov 1958, 258, in Buchanan, Holt, and Lessel 1966, 30, a lapsus calami. This name is not found in the 1958 Krasil’nikov paper.

Etymology: *bacillaris* L. dim. n. bacillum, small rod; M.L. *bacillus*, rodlet; L. adj. sulf.-arís, pertaining to; M.L. *bacillaris*, pertaining to rodlet.
**Streptomyces caesius** (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 118. Krasil’nikov et al. stated that strain INMI 118 “might be” the type strain of five described (original designation).

**Synonymy:** *Actinomyces caesius* Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965, 100.

**Etymology:** cae’si.us L. adj. caesius, bluish gray.

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**Streptomyces chlorobiens** (Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 6166 by original designation as the “typical representative” in table 19 of the original manuscript.

**Synonymy:** *Actinomyces chlorobiens* Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965, 194.

**Etymology:** chlo.ro’bi.ens Gr. adj. chloros, greenish yellow, green; Gr. n. bios, life; M.L. part. adj. chlorobiens, living greenish yellow.

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**Streptomyces chrysellus** (Krasil’nikov, Korenyako, and Nikitina in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 1007n = ATCC 19829 (single isolate).

**Synonymy:** *Actinomyces chrysellus* Krasil’nikov, Korenyako, and Nikitina in Krasil’nikov (ed.) 1965, 224.

**Etymology:** chry’se.us Gr. adj. chrysos, golden; M.L. adj. chryseus, golden.

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**Streptomyces citreofluorescens** (Korenyako, Sokolova, and Nikitina 1960) comb. nov.

**Type strain:** (None by original designation); INMI 2292 = RIA 648 = ATCC 18858 = ATCC 28898 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International *Streptomyces* Project.

**Synonymy:** *Actinomyces citreofluorescens* n. sp. Korenyako, Sokolova, and Nikitina 1960, 69.

**Etymology:** cit’re.o.fluo.ores’cens L.n. citrus, citrus tree; L.n. fluor, flux; M.L.v. fluoresco, to fluoresce; M.L. part. adj. citreofluorescens, referring to the yellow fluorescent diffusible pigment produced by the organism.

**Remarks:** Further documentation of this taxon is in Korenyako, Krasil’nikov, Nikitina, and Sokolova in Rautenshtein (ed.) 1960, 156 (Eng. transl. 1966, 149). Also seen in initial article as *A. citreofluorescens* (sic), a lapsus calami.

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**Streptomyces coelestis** (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.
**Type strain:** (None by original designation); INMI 20–41 = ATCC 19830 by deposit in an internationally recognized culture collection.

**Synonymy:** *Actinomyces coelescens* Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965, 100.

**Etymology:** *coe.les’cens* L.n. *caelum*, sky; L. adj. v. termination *-escens*, beginning, slightly; M.L. part. adj. *coelescens*, slightly blue.

**Streptomyces coeliatus** (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** (None by original designation); INMI 37–H = ATCC 19833 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.

**Synonymy:** *Actinomyces coeliat1ls* Krasil’nikov, Sorokina, Alferova, and Bezzubenkovain Krasil’nikov (ed.) 1965, 86.

**Etymology:** *coe.li.a’tus* L.n. *caelum*, sky; L. suf. -atus, provided with; M.L. adj. *coeliatus*, provided with blue.

**Streptomyces coelicolor** (Müller 1908) Waksman and Henrici 1948 subsp. *coelicoferus* (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 1250 by original designation by Krasil’nikov et al. (1965). Also single isolate.

**Synonymy:** *Actinomyces coelicoferus* n. subsp. (sic) Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965, 105.


**Streptomyces coelicolor** (Müller 1908) Waksman and Henrici 1948 subsp. *coelicolatus* (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 464 (single isolate).

**Synonymy:** *Actinomyces coelicolatus* n. subsp. (sic) Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965, 105.

Streptomyces coelicolor (Müller 1908) Waksman and Henrici 1948

subsp. coelicolor

(Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 62, lowest numbered designate of two described and assumed to be type strain by number priority.


Etymology: coelicolor subsp. coelicovarians L.n. caelum, sky; L.n. color, color; M.L. adj. coelicolor, sky colored; L.n. caelum, sky; L. prefix con-, with; L. part. adj. varians, varying; M.L. part. adj. coelicovarians, with varying sky (blue) color; M.L. coelicolor subsp. coelicovarians, the subspecies with varying sky (blue) color of the sky (blue)-colored streptomycete.

Streptomyces coerulatus (sic) (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) subsp. amylolyticus

(Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: INMI 1031-4 (single isolate).


Etymology: coerulatus (sic) subsp. amylolyticus (sic) L. adj. coerulcus, dark blue, azure; L. adj. suif. -atus, provided with; M.L. adj. coerulatus, provided with dark blue; Gr. n. amylum, fine meal, starch; Gr. adj. lyticus, loosening, dissolving; M.L. adj. amylolyticus, starch dissolving; M.L. coerulatus subsp. amylolyticus, the starch-dissolving subspecies of the streptomycete provided with dark blue.

Remarks: This taxon is not definitively proposed as a new subspecies but intent appears to be proposal as such.

Streptomyces coerulatus (sic) (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) subsp. anaseuli

(Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: INMI 243–13 (single isolate).

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**Etymology:** coeruleatus (sic) subsp. anaseulii L. adj. caeruleus, dark blue, azure; L. adj. suf. -atus, provided with; M.L. adj. coeruleatus (sic), provided with dark blue; subspecific epithet of uncertain origin; M.L. coeruleatus (sic) subsp. anaseulii, the (?) subspecies of the streptomycete provided with dark blue.

**Remarks:** This taxon is not definitively proposed as a new subspecies but intent appears to be proposal as such.

**Streptomycyes coerulatus** (sic) (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) **subsp. coerulatus** (sic) (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 1057 by original designation by Krasil'nikov et al. (1965).

**Synonymy:** Actinomyces coeruleatus (sic) Krasil'nikov, Sorokina, Alferova, and Bezzubenkova in Krasil'nikov (ed.) 1965, 86 and 88.

**Etymology:** coeruleatus (sic) L. adj. caeruleus, dark blue, azure; L. adj. suf. -atus, provided with; M.L. adj. coeruleatus, with dark blue.

**Streptomycyes coeruleofuscus** (sic) (Preobrazhenskaya 1957) Pridham, Hesseltine, and Benediet 1958 **subsp. actinomycini** (Maksimova and Kovsharova 1964) comb. nov.

**Type strain:** (None designated of two studied.)

**Synonymy:** Actinomyces coeruleofuscus (sic) var. actinomycini Maksimova and Kovsharova 1964, 112.

**Etymology:** coeruleofuscus (sic) subsp. actinomy. cin'i L. adj. caeruleus, dark blue, azure; L. adj. fuscus, dark or tawny; Gr. n. actis, actinis, ray; M.L. suf. -mycin, used for many antibiotic names; M.L. adj. coeruleofuscus (sic), dark blue, tawny; M.L. gen. n. actinomyctni, of actinomycin; M.L. coeruleofuscus (sic) subsp. actinomycini, referring to the actinomycin-producing subspecies of the dark-blue, tawny streptomycete.

**Streptomycyes coeruleoroseus** (sic) (Preobrazhenskaya 1966) comb. nov.

**Type strain:** INA 9106 by original designation by Preobrazhenskaya 1966, 857.

**Synonymy:** Actinomyces coeruleoroseus (sic) Preobrazhenskaya 1966, 857.

**Etymology:** coeruleoroseus (sic) L. adj. caeruleus, dark blue, azure; L. adj. rosus, rose colored; M.L. adj. coeruleoroseus (sic), dark blue rose colored.

**Streptomycyes cyanodalus** (Krasil'nikov and Agre in Rautenshteyn (ed.) 1960) comb. nov.
**Type strain:** (None by original designation); INMI 414 = ATCC 15859 = ATCC 23902 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project. Six strains were designated by number in the original description.

**Synonymy:** Actinomyces cyanoalbus Krasil’nikov and Agre in Rautenshtein 1960, 273 (Eng. transl. 1966, 271).

**Etymology:** *cyanoalbus* Gr. adj. *cyaneus*, dark blue; L. adj. *albus*, white; M.L. adj. *cyanoalbus*, dark blue white, possibly referring to occurrence of both white and blue vegetative mycelium of the organism.

**Streptomyces cyanoalbus** (Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** (None by original designation); INMI 31–23 = ATCC 19835 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.

**Synonymy:** Actinomyces cyanocolor Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965, 100.

**Etymology:** *cyanocolor* Gr. adj. *cyanus*, dark blue; L. n. color, color; M.L. adj. *cyanocolor*, dark blue colored.

**Streptomyces cyanocolor** (Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** (None by original designation); INMI 31–23 = ATCC 19835 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.

**Synonymy:** Actinomyces cyanogenus Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965, 100.

**Etymology:** *cyanogenus* Gr. adj. *cyanus*, dark blue; Gr. v. suf. -genes, producing; M.L. adj. *cyanogenus*, producing dark blue.

**Streptomyces cyanogenerus** (Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 31–M by original designation by Krasil’nikov et al. (1965).

**Synonymy:** Actinomyces cyanoglomerus Krasil’nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil’nikov (ed.) 1965, 86.

**Etymology:** *cyanoglomerus* Gr. adj. *cyanus*, dark blue; L.t.v. *glomer*, form into a ball; M.L. adj. *cyanoglomerus*, dark blue formed into a ball.

**Remarks:** Three subspecies of this taxon also were named and described by Krasil’nikov et al. (1965). These names are considered illegitimate (Rules 6 and 7, “International Code of Nomenclature of Bacteria”) and are not treated here.
**NEW NAMES AND NEW COMBINATIONS IN ACTINOMYCETALES**

**Streptomyces erythreus** (Waksman 1923) Waksman and Henrici 1948

*subsp. speleomycinii* (Sabo and Preobrazhenskaya 1962) comb. nov.

**Type strain:** Not designated in original description, but may be single isolate.

**Synonymy:** Actinomyces erythreus var. speleomycinii Sabo and Preobrazhenskaya 1962, 317.

**Etymology:** erythreus subsp. speleomycinii Gr. adj. erythraeus, red; L.n. spelaeum, cave, den; M.L. suf. -mycin, for antibiotic names; M.L. gen. n. speleomycinii, of speleomycin; M.L. erythreus subsp. speleomycinii, referring to the speleomycin-producing subspecies of the red streptomycete.

**Nocardia farinosa** (Krasil’nikov 1941) comb. nov.

**Type strain:** (None designated of 16 strains isolated and five designated by number.) None of the 16 strains probably are extant.

**Synonymy:** Actinomyces farinosus n. sp. Krasil’nikov 1941, 51 (Eng. transl. 1966, 60.

**Etymology:** farinosus L. adj. farinosus, mealy.

**Remarks:** Formation of oidiomycetes (segmentation spores) was reported for this taxon in the original description of Krasil’nikov; hence the organism clearly is not a streptomycete and is best classified as a nocardia at this time.

**Streptomyces flavovariabilis** (Korenyako and Nikitina in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMII 702 (single isolate).

**Synonymy:** Actinomyces flavovariabilis Korenyako and Nikitina in Krasil’nikov (ed.) 1965, 294 and 304.

**Etymology:** flavo-variabilis L. adj. flavus, yellow; L. adj. variabilis, variable; M.L. adj. flavovariabilis, yellow variable.

**Streptomyces fluorescens** (Krasil’nikov 1958) comb. nov.

**Type strain:** (None by original designation); INMII 592 = ATCC 15860 = ATCC 23907 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.

**Synonymy:** Actinomyces fluorescens Nikitina 1957, according to Kostachev 1958, 142. Not validly published.

**Etymology:** fluorescens L.n. fluor, flux; M.L.v. fluorescere, to fluoresce; M.L. part. adj. fluorescens, fluorescing.

**Streptomyces fulvoviolaceus** (Artamonova and Krasil’nikov in Rautenschein (ed.) 1960) comb. nov.

**Type strain:** INMII 9700 = ATCC 15862 (single isolate).


Remarks: The reasons for coining the epithet “*fulvoviolaceus*” for this taxon are obscure, based on examination of the published description.

*Streptomyces fulvoviridis* (Kuchaeva, Krasil’nikov, Skryabin, and Tapykova in Rautenshtein (ed.) 1960) comb. nov.

*Type strain:* (None by original designation); VI-10-3 ČSAV= INM1 16-3=RIA 660=ATCC 15863=ATCC 23909 by deposit in an internationally recognized culture collection and subsequent designation by Krasil’nikov for the International Streptomyces Project.


*Actinomyces fulvoviridis* n. sp. Kutchayeva, Krasil’nikov, and Skryabin 1960, 58 (not validly pub.).

Etymology: ful’vo.viridis L. adj. fulvus, reddish yellow; L. adj. viridis, green; M.L. adj. *fulvoviridis*, reddish yellow green, referring to green vegetative mycelium and yellow diffusible pigment of the organism.

Remarks: The type strain originally was obtained from a culture collection by Krasil’nikov et al. (1959) as a strain of *Actinomyces olivaceus*.

*Nocardia fumosa* (Krasil’nikov 1941) comb. nov.

*Type strain:* (None designated of two strains isolated and one (No. 21) designated by number.) Neither strain probably is extant.


*Streptomyces fumosus* (Krasil’nikov 1941) Waksman 1953, 92.

Etymology: fumoa’sa L. adj. fumosus, smoky, smoked.

Remarks: Formation of oidiospores (segmentation spores) was reported for this taxon in the original description of Krasil’nikov; hence the organism clearly is not a streptomyces and is best classified as a nocardia at this time.

*Streptomyces globisporus* (Krasil’nikov 1941) Waksman 1953 subsp. *tundromycini* (Kovalenko 1957) comb. nov.
Type strain: Designation unknown.

Synonymy: Actinomyces globisporus tundromycini (sic) Kovalenkov 1957, 79.

Actinomyces globisporus subsp. tundromycini (sic) Kovalenkov 1957, 80, in Buchanan, Holt, and Leselle 1966, 43.

Etymology: globisporus subsp. tundromycini L. mas. n. globus, round body; Gr. fem. n. spora, seed; M.L. n. spora, spore; M.L. adj. globisporus, round spored; Russian n. of Lappic origin tundra, level, treeless plain of northern arctic regions; L. suf. -mycin, for antibiotic names; M.L. gen. n. tundromycini, of tundra; M.L. globisporus subsp. tundromycini, referring to the tundromycin-producing subspecies of the round-spored streptomycete.

Streptomyces glomeroulantium (Krasil'nikov and Yuan in Krasil'nikov (ed.) 1965. comb. nov.

Type strain: INMI 1464=ATCC 18866 by original designation by Krasil'nikov and Yuan.


Etymology: glomeroulantium L.t.v. glomero, form into ball; L. neut. n. aurum, gold; M.L. neut. n. Aurantium, generic name of orange; M.L. adj. glomeroulantium, orange colored, formed into ball.

Microellospora grisea (Konev, Tsyganov, Minbaev, and Morogov 1967) comb. nov.

Type strain: LIA P-147 (single isolate).


Etymology: grisea M.L. adj. griseus, gray.

Remarks: In the paper by Konev et al. Echinospora gen. nov., a lapsus calami, is cited.

Streptomyces griseourantiacus (Krasil'nikov and Yuan in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: INMI AK-5 (single isolate).


Etymology: gris eo aurantiacus Old French adj. gris, gray; Med. L. adj. griscus, gray; L. neut. n. aurum, gold; M.L. neut. n. Aurantium, generic name of orange; M.L. adj. griseourantiacus, orange colored with gray.

Streptomyces grisius (Krasil'nikov 1958) comb. nov.

Type strain: INMI 15 by original designation by Krasil'nikov, Belozersky, Rantenshtein, et al. (1957).

*Actinomyces griseus* Krasil’nikov 1958, 263.


*Streptomyces helvaticus* (sic) (Krasil’nikov, Korenyako, and Nikitina in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 1013a=ATCC 19841 (single isolate).


**Etymology:** *helvaticus* M.L. n. Helvetia, Switzerland; o.v. of M.L. adj. *helveticus*, belonging to Switzerland, Swiss.

*Streptomyces herbescens* (Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 1252 by original designation by Krasil’nikov and Yegorova.

Synonymy: *Actinomyces herbescens* Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965, 166.

**Etymology:** *herbescens* L.i.v. *herbesco*, grow into blades; L. part. adj. *herbescens*, beginning to grow into blades, probably meaning producing green growth.

*Streptomyces herbeus* (Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 2339 (single isolate).


**Etymology:** *herbeus* L. adj. *herbeus*, grass green.

*Streptomyces herbiferis* (Krasil’nikov and Yegorova in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 10 (single isolate).


**Etymology:** *herbiferis* L. adj. *herbifer*, grassy; M.L. gen. adj. *herbiferis*, of grassy, probably meaning green.

*Streptomyces indigocolor* (Krasil’nikov, Sorokina, Alfirova, and Bezubenko in Krasil’nikov (ed.) 1965) comb. nov.

**Type strain:** INMI 206=ATCC 19842. Krasil’nikov et al. stated that strain INMI 206 “might be” the type strain of two described.

Synonymy: *Actinomyces indigocolor* Krasil’nikov, Sorokina, Alfirova, and Bezubenko in Krasil’nikov (ed.) 1965, 86.
Etymology: indigo.color Gr. n. indikon, indigo; L.n. indicum, indigo; Spanish n. indigo, indigo; L.n. color, color; M.L. adj. indigocolor, indigo blue colored.

Streptomyces iodoformicus (Kirillova and El-Registan in Krasil’nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 18–18, lowest numbered designate of two strains described.


Etymology: iodoformicus Gr. n. iων, violet; M.L.n. iodinum, iodine; L. fem. n. formica, ant (formic acid, formyl); M.L. adj. iodoformicus, belonging to iodoform.

Remarks: Possibly a nocardia because of report it lacks proteolytic and hydrolytic activity.

Streptomyces janthinus (Artamonova and Krasil’nikov in Rautenshtein (ed.) 1960) comb. nov.

Type strain: (None by original designation of four described); 17=INMI 17=RIA 659=ATCC 15870=ATCC 23925 by deposit and by subsequent designation by Krasil’nikov for the International Streptomyces Project.


Etymology: janthinus L. adj. janthinus (sic), violet colored.

Remarks: The name also appears as Actinomyces janthinus (sic) in the original description.

Streptomyces lavendofoliae (Kuchaeva, Krasil’nikov, Taptykova, and Gesheva 1961) comb. nov.

Type strain: INA 3613=ATCC 15872=ATCC 23928 (single isolate).

Synonymy: Actinomyces lavendofoliae Kuchaeva, Krasil’nikov, Taptykova, and Gesheva 1961, 120.

Etymology: la.ven’do.fo’li.ae M.L.n. lavendula, lavender; L.n. folium, leaf; M.L. gen. n. lavendofoliae, of lavender leaf, probably intended to refer to the lavender-colored aerial mycelium (foliage) of the organism.


Type strain: IMRU 3516 (single isolate).

Etymology: *lavendulae* subsp. *avireus* M.L.n. *lavandula*, lavender; M.L. gen. n. *lavendulae*, of lavender color; Gr. prefix *a-*, signifying negation or absence of; L.n. *virus*, poison, virus; M.L.n. (o.v.) *avireus*, absence of virus; M.L. *lavendulae* subsp. *avireus*, the subspecies free of virus of the lavender-colored streptomycete, but referring to the lack of antiviral activity of the organism.

Remarks: Strain IMRU 3516 originally was named *Streptomyces lavendulae* (Waksman and Curtis 1916) Waksman and Henrici 1948, following isolation from soil previously treated with various sulfur compounds (Hutchison, Swart, and Waksman 1949). It was reported to produce a streptothricin complex named streptothricin VI.


Type strain: IAM 2A-458=ATCC 15875 (single isolate).


*Streptomyces lavendulocolor* (Kuchaeva, Krasil'nikov, Taptykova, and Geshova 1961) comb. nov.

Type strain: I~A 4518=ATCC 15871=ATCC 23927 (single isolate).


Remarks: This taxon originally was named *Actinomyces lavendulae* by Preobrazhenskaya and Svechnikova (1957). There are two orthographic variants of the name proposed by Kuchaeva et al. now in the literature. They are *Actinomyces lavendulocolor* (sic) in the original article by Kuchaeva et al. (1961) and
Actinomyces lavendicolor (sic) in Lessel 1968, 6, and Shirling and Gottlieb 1968, 339.

Streptomyces laxureus (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 383–K=ATCC 19843 by deposit.


Etymology: laxureus L. adj. laxureus, referring to blue of vegetative mycelium and dispersible pigment.

Streptomyces levoris (Krasil’nikov 1958) comb. nov.

Type strain: (None by original designation); INMI 2725=ATCC 15876=ATCC 23929 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for the International Streptomyces Project.

Synonymy: Actinomyces levoris Nikitina 1957, according to Kostachev 1958, 142. Not validly published.

Etymology: levoris L. gen. mas. n. levoris, of smoothness.

Streptomyces lividans (Krasil’nikov, Sorokina, Alferova, and Bezzubenkova in Krasil’nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 32–13=ATCC 19844 by deposit in an internationally recognized culture collection.


Etymology: lividans L. part. adj. lividans, becoming bluish, black, and blue.

Nocardia longissima (Krasil’nikov 1941) comb. nov.

Type strain: (None designated of two strains isolated.)


Etymology: longissimus L. sup. adj. longissimus, longest, very long.

Remarks: Formation of segmentation spores (oidiospores) was reported for this taxon in the original description of Krasil’nikov; hence the organism clearly is not a streptomycete and is best classified as a nocardia at this time. The 15 strains named Actinomyces longissimus Kras. (1941) Emend. (sic) by Krasil’nikov and Yuan (1965) and Actinomyces longissimus ramus (sic) Yuan in Konova (1962), a nonvalidly published name, should be reevaluated in light of the report that the taxon originally was reported to form segmentation spores and not fragmentation spores.
Streptomyces malachiticus (Kudrina, Preobrazhenskaya, and Ryabova in Gauze (ed.) 1957) comb. nov.

**Type strain:** (None by original designation); INA 399/54=ATCC 19918=ATCC 19784 by deposit in an internationally recognized culture collection and by designation by Preobrazhenskaya for the International *Streptomyces* Project; also by publication by Gauze in Gottlieb (1968).


**Etymology:** *malachiticus* (Gr. n. *malachite*, mallow, referring to green of mallow leaves; L.n. *malve*, mallow; M.L. adj. *malachiticus*, belonging to mallow).

Streptomyces malachitofuscus (Preobrazhenskaya, Maksimova, and Blinov 1964) comb. nov.

**Type strain:** (None by original designation); strain INA 739 subsequently selected by Gauze for the International *Streptomyces* Project.

**Synonymy:** Actinomyces malachitofuscus Preobrazhenskaya, Maksimova, and Blinov 1964, 963.

**Etymology:** *malachitofuscus* (Gr. n. *malache*, mallow; L.n. *malve*, mallow; L. adj. *fuscus*, dark or tawny; M.L. adj. *malachitofuscus*, mallow dark (dark green)).

Streptomyces malachitorectus (Preobrazhenskaya, Maksimova, and Blinov 1964) comb. nov.

**Type strain:** (None by original designation); INA 8954 characterized in detail and subsequently selected by Gauze for the International *Streptomyces* Project.

**Synonymy:** Actinomyces malachitorectus Preobrazhenskaya, Maksimova, and Blinov 1964, 963.

**Etymology:** *malachitorectus* (Gr. n. *malache*, mallow; L.n. *malve*, mallow; L. adj. *rectus*, straight; M.L. adj. *malachitorectus*, mallow straight (straight and mallow green)).

Streptomyces mellinus (Maksimova, Kovsharova, and Proshlyakova 1965) comb. nov.

**Type strain:** Designation unknown.

**Synonymy:** Actinomyces mellinus Maksimova, Kovsharova, and Proshlyakova 1965, 302.

**Etymology:** *mellinus* L. adj. *mellitus*, honeyed, sweet; L. adj. *mellinus*, of honeyed, of sweet, referring to honey color.

Streptomyces ochraceiscleroticus nom. nov.

**Type strain:** 10A-30 = RIA 710 = ATCC 15814 (single isolate).

Etymology: ochr'aceus, like ochre, rust colored; Gr. adj. *sclerus*, hard; M.L. neut. n. *sclerotium*, sclerotium; M.L. adj. *ochraceoscleroticus*, sclerotium with rust color, pertaining to ability to form sclerotia and to rust color.

*Streptomyces olivarillus* (Kuchava, Krasil'nikov, and Skryabin 1960) comb. nov.

Type strain: (None by original designation); probably is INMI 1300a, referred to only once as a colored illustration of an agar slant culture in Kuchavea, Krasil'nikov, and Taptykova in Rautenshtein (ed.) 1960, facing page 242. It apparently is one of six strains placed in the taxon by Krasil'nikov, Kuchaeva, and Skryabin (1959). Six strains were stated to comprise this taxon.


Actinomyces olivarillus n. sp. (sic) Kuchayeva, Krasil'nikov, and Skriabin 1960, 58.

Etymology: oliv'arillus L.n. oliv'ar, olive; L.n. stem suf. -arillus, belonging to; M.L. adj. oliv'arillus, belonging to olive.

*Streptomyces olivoviridis* (Kuchayeva, Krasil'nikov, and Skryabin 1960) comb. nov.

Type strain: (None by original designation); INMI 1475=RIA 661=ATCC 15382=ATCC 23944 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil'nikov for the International *Streptomyces* Project. Nine strains of this taxon were numbered.


Actinomyces olivoviridis Kuchayeva, Krasil'nikov, and Skryabin 1960, 58.

Remarks: One orthographic variant of the specific epithet of this taxon has been noted in the literature, i.e., *Act. olivoviridis* (sic), a lapsus calami on page 248 of the paper by Kuchaeva, Krasil'nikov, Skryabin, and Tapykova in Rautenshtein (ed.) 1960, but corrected to *Act. olivoviridis* on page 245 of the 1966 English translation.

*Streptomyces pneumonicus* (Krasil'nikov, Nikitina, and Kondrat'eva in Rautenshtein (ed.) 1960) comb. nov.

**Type strain:** INM1 367 (single isolate).


**Etymology:** pneumonicus Gr. n. pneumonia, pneumonia; M.L. suf. -icus, added to noun stems to denote possession or emphasis; M.L. pneumonicus, referring to pneumonia, particularly to the action of the organism against pneumococci.

*Streptomyces pseudovenezuelae* (Kuchaeva, Krasil'nikov, Tapykova, and Geshev 1961) comb. nov.

**Type strain:** (None by original designation); IMRU 3774 = ATCC 23951 subsequently selected by Krasil'nikov for the International Streptomyces Project.

**Synonymy:** *Streptomyces sp.* 3774 in Murat, Stinebring, Schaffner, and Lechevalier 1959, 109.


**Etymology:** pseudovenezuelae Gr. adj. pseudes, false; M.L. n. Venezuela, Venezuela; M.L. gen. n. venezuelae, of Venezuela; M.L. gen. n. pseudovenezuelae, of false Venezuela.

*Streptomyces raffinosus* (Krasil'nikov 1958) comb. nov.

**Type strain:** (None by original designation); INMI 058 = ATCC 15883 by deposit in an internationally recognized culture collection.

**Synonymy:** *Actinomyces raffinosus* Nikitina 1957, according to Kostanchev 1958, 142. Not validly published.

*Actinomyces raffinosus* Krasil'nikov 1958, 258.

**Etymology:** raffinosus French v. raffiner, to refine; French suf. -ose, pertaining to carbohydrates; M.L. adj. raffinosus, of raffinose, pertaining to ability of organism to utilize raffinose.

Remarks: Zvirbulis and Hatt (1969) stated that the name *Actinomyces raffinosus* Krasil'nikov 1958, 258, is not validly published (Rule 12c (3), "International Code of Nomenclature of Bacteria"). However, there is more than incidental mention of the taxon, and it is described as adequately as many others.
Streptomyces rectiviolaceus (Artamonova in Krasil’nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 563, lowest numbered designate of 12 strains described. Strain INMI 772 referred to on page 140 as A. violaceus var. rectus by Krasil’nikov and Khusein (1965).


Actinomyces rectiviolaceus Artamonova in Krasil’nikov (ed.) 1965, 234.

Etymology: recti.violace.uus L. aclj. rectus, straight; L. adj. viola­ceus, violet colored; M.L. aclj. rectiviola’ceus, straight violet colored.

Streptomyces robefuscus (Krasil’nikov and Vinogradova in Rautenshtein (ed.) 1960) comb. nov.

Type strain: (None by original designation); INMI 3. Strain INMI 3 is associated with the name in a definitive manner in table 10 of the original description and is assumed to be the type strain.


Etymology: rob.e.fus’cus Gr. n. robur, strength, literally hard wood, e.g., oak; L. aclj. contraction “e” of L. aclj. suf. -eus, sometimes denoting similarity; L. aclj. fuscus, dark or tawny; M.L. aclj. robefuscus, similar to dark oak, referring to dark oak color of vegetative mycelium.

Streptomyces robeus (Krasil’nikov and Vinogradova in Rautenshtein (ed.) 1960) comb. nov.

Type strain: (None by original designation); INMI 8. Strain INMI 8 is associated with the name in a definitive manner in table 10 of the original description and is assumed to be the type strain.


Etymology: rob’euus Gr. n. robur, strength, literally hard wood, e.g., oak; L. aclj. suf. -eus, sometimes denoting similarity; M.L. aclj. robeus, similar to oak, referring to color of vegetative mycelium and dispersible pigment of the organism.

Streptomyces robustrus (Krasil’nikov and Vinogradova in Rautenshtein (ed.) 1960) comb. nov.

Type strain: (None by original designation); INMI 5.

Etymology: *robustus* Gr. n. *robur*, strength, literally hard wood, e.g., oak; contraction "us" of L. adj. suf. "-eus", sometimes denoting similarity; M.L. adj. *robustus*, similarity to oak, referring to color of fumed oak as color of vegetative mycelium.

Remarks: Strain INMI 4 also is associated with the name in a definitive manner but with two different subgroups. However, strain INMI 4 also is a designate for *Actinomyces violaceolalus* (p. 28).

**Streptomyces rubro-cyanus** (Krasil'nikov and Khusein in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: (None by original designation); INMI 21, the lowest numbered designate of 84 strains studied and nine listed. Strain INMI 21 is assumed to be the type strain by number priority.


**Streptomyces spinosus** (Preobrazhenskaya 1966) comb. nov.

Type strain: INA 3763 by original designation by Preobrazhenskaya 1966, 856.

Synonymy: *Actinomyces spinosus* Preobrazhenskaya 1966, 856.


**Streptomyces subflavus** (Krasil'nikov, Korenyako, and Nikitina in Krasil'nikov (ed.) 1965) comb. nov.

Type strain: INMI 434 = ATCC 19846 (single isolate).


**Streptomyces syringae** (Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961) comb. nov.

Type strain: (None by original designation); Merck 3R14(M1) = IMRU 3445 because it has the most definitive history associated with it.


Etymology: *syrin*gae Gr. n. *syrinx*, *syringis*, pipe or tube; M.L. fem. n. *Syringa*, generic name of syringa or lilac; M.L. fem. gen. n. *syringae*, of lilac.

Remarks: There is one orthographic variant of the name now in the literature, i.e., *Ast.* (sic) *cyringae* (sic) in the original article by Kuchaeva et al. (1961). Hüttler (1964) also listed an *A.* syringi, which should not be confused with this taxon and repre-
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sents a lapsus calami for A. syringini Preobrazhenskaya and Sveshnikova in Gauze (ed.) 1957.

Streptomyces tauricus (Ivanitskaya, Upiter, Sveshnikova, and Gauze 1966) comb. nov.
Type strain: INA 8173 selected by Gauze for the International Streptomyces Project.
Etymology: tauricus L. adj. tauricus, Taurian, Thracian of the Crimea, Albanian.
Remarks: The only strain designation given in the original description of Ivanitskaya et al. is 13170. The relationship of strain INA 8173 to strain 13170 is unknown.

Streptomyces thermoflavus (Kudrinar and Maksimova 1963) comb. nov.
Type strain: None designated of 10 to 17 studied.
Etymology: thermoflavus Gr. n. therme, heat; L. adj. flavus, yellow; M.L. adj. thermoflavus, heat yellow.

Streptomyces tian-schanicus (Novogrudsky 1950) comb. nov.
Type strain: None designated of nine described.
Remarks: Novogrudsky's 1950 paper has not been located.

Streptomyces toxicus (Krasil'nikov 1958) comb. nov.
Type strain: Designation unknown.
Synonymy: Actinomyces toxicus Krasil'nikov 1958, 258.
Etymology: tox'i.i.cus L.n. toxicum, poison; M.L. adj. toxicus, toxic.

Streptomyces tumemacerasans (Krasil'nikov and Koveshnikov 1962) comb. nov.
Type strain: INMI P-42 (single isolate) and by original designation by Krasil'nikov and Koveshnikov.
Etymology: tumemacerasans L.i.v. tumeo, swell, form tumor; L. part. adj. macerasans, softening by steeping, to ret; M.L. part. adj. tumemacerasans, softening a tumor.

Streptomyces valynus (sic) (Preobrazhenskaya 1966) comb. nov.
Type strain: INA 612 by original designation by Preobrazhenskaya 1966, 857.
Etymology: *valy`nus* Unknown; possibly from L. adj. *valinus*, of Velia (in Rome).

**Streptomyces violaceochromogenes** (Ryabova and Preobrazhenskaya in Gauze (ed.) 1957) comb. nov.

**Type strain**: (None by original designation); INA 425, lowest numbered designate of 11 described; also selected by Preobrazhenskaya and approved by Krasil`nikov as the type strain for the International Streptomyces Project.

**Synonymy**: *Actinomyces violaceus chromogenes* n. subsp. (sic) Krasil`nikov 1949, 55 (German transl. 1959, 59). Illegitimate; Rules 6 and 7, "International Code of Nomenclature of Bacteria."


**Etymology**: *vi.o.la`ce.o.chro.mo`gen.es* L. adj. *violaceus*, violet; Gr. n. *chroma*, color; Gr. v. suf. -genes, producing; M.L. adj. *violaceochromogenes*, producing violet color.

**Remarks**: Strain INM1 2929 = HIA 657 = ATCC 15893 was selected by Krasil`nikov as the type strain for *Actinomyces violochromogenes* Artamonova and Krasil`nikov in Rautenshtein 1960, 334. Because the name is illegitimate and because still another strain (INA 425) was selected as the type strain by the authors of *Actinomyces violaceochromogenes* Ryabova and Preobrazhenskaya in Gauze (ed.) 1957, strain INM1 2929 must simply be considered as only another strain of the taxon *A. violaceochromogenes*.

**Streptomyces violaceolatus** (Krasil`nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil`nikov (ed.) 1965) comb. nov.

**Type strain**: (None by original designation); strain INM1 4 = ATCC 19847 by deposit.

**Synonymy**: *Actinomyces violaceolatus* Krasil`nikov, Sorokina, Alferova, and Bezzenbenkova in Krasil`nikov (ed.) 1965, 100.


**Remarks**: See remarks under *Streptomyces robustus*.

**Type strain:** (None by original designation); INMI 829, lowest numbered designate of eight strains described.

**Synonymy:** *Actinomyces violaceus confinis* n. subsp. (sic) Artamonova and Krasil'nikov in Rautenshtein 1960, 328 (Eng. transl. 1966, 321).

**Etymology:** vi.o.la'ce.us subsp. con.fit.nus L. adj. *violaceus*, violet; o.v. of L. adj. *confinis* (sic)—*confinis*, adjacent, near; M.L. *violaceus subsp. confinis*, the near subspecies of the violet streptomycete.


**Type strain:** (None by original designation); INMI 1022, earliest isolated strain of record of eight strains designated in the original description of Artamonova and Krasil'nikov (1960).

**Synonymy:** *Actinomyces violaceus vici.nus* n. subsp. (sic) Artamonova and Krasil'nikov in Rautenshtein (ed.) 1960, 328 (Eng. transl. 1966, 321).

**Etymology:** vi.o.la'ce.us subsp. vi.ci.nus L. adj. *violaceus*, violet; L. adj. *vici.nus*, neighboring, near; M.L. *violaceus subsp. vici.nus*, the near subspecies of the violet streptomycete.


**Type strain:** Designation unknown.

**Synonymy:** *Actinomyces violaceus-niger var. crystal.lo.my.cini* (sic) Gauze, Preobrazhenskaya, Kovalenko, et al. 1957, 10.


**Streptomyces violans** (sic) (Artamonova and Krasil'nikov in Rautenshtein, ed.) 1960) comb. nov.

**Type strain:** INMI 167 (single isolate).

**Synonymy:** *Actinomyces violans* Artamonova and Krasil'nikov in Rautenshtein (ed.) 1960, 336 (Eng. transl. 1966, 328).

**Etymology:** vi.o.lan.s' L. part. *violans*, violating, but probably from L. fem. n. *viola*, violet, referring to pink to violet color of aerial and vegetative mycelium.
Remarks: Not to be confused with *Chainia violens* Kalakutskii and Krasil’nikov in Rautenshttein (ed.) 1960, treated later in this bulletin.

**Streptomyces violarius** (sic) (Artamonova and Krasil’nikov in Rautenshtein (ed.) 1960) comb. nov.

**Type strain:** (None by original designation); INMI 1212=RIA 157=ATCC 15891 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil’nikov for International *Streptomyces* Project. Strain INMI 1212 is the lowest numbered designate of four designated and described.

**Synonymy:** *Actinomyces violans* (sic) Artamonova and Krasil’nikov in Rautenshtein (ed.) 1960, 328 (Eng. transl. 1966, 321).

**Etymology:** *violarius* L. fem. n. *violans*, violet; o.v. of M.L. adj. *violarius* (sic), *violaris*, pertaining to violet.

Remarks: Strain INMI 1212 also is designated as the type strain for *Chainia violans* Kalakutskii and Krasil’nikov in Rautenshttein (ed.) 1960, treated later in this bulletin. There are two orthographic variants of the name proposed by Artamonova and Krasil’nikov now in the literature. They are *Actinomyces violarius* (sic) in the English translation of the original article by Kalakutskii and Krasil’nikov (1966) and *Actinomyces violarius* (sic) in Lessel (ed.) 1968, 6.

**Streptomyces violatus** (Artamonova and Krasil’nikov in Rautenshtein (ed.) 1960) comb. nov.

**Type strain:** INMI 1205=ATCC 15892 (single isolate).

**Synonymy:** *Actinomyces violatus* Artamonova and Krasil’nikov in Rautenshtein 1960, 328 (Eng. transl. 1966, 324).

**Etymology:** *viola’tus* L. fem. n. *viola*, violet; M.L. adj. *violatus*, provided with violet.

**Remarks:** Strain INMI 1205 is designated as a strain number for *Actinomyces violans* (Artamonova and Krasil’nikov in Rautenshtein (ed.) 1960, 328) treated earlier in this bulletin. The epithet *"violatus"* is not to be confused with *"violans,"* both of which are treated in this bulletin.
Streptomyces viridaris (Krasil'nikov and Yegorova in Krasil'nikov (ed.) 1965) comb. nov.

**Type strain:** INMII 1876 by original designation as the “typical representative” in table 19 of the original description.

**Synonymy:** Actinomyces viridaris Krasil'nikov and Yegorova in Krasil'nikov (ed.) 1965, 175.

**Etymology:** vi.ri.dar'i~ Probably from L.i.v. viridor, become green; M.L. adj. v. viridaris, pertaining to becoming green.

Streptomyces virocidus (Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961) comb. nov.

**Type strain:** INMII 1609, the “basic representative” by original designation by Kuchaeva et al. (1961).

**Synonymy:** Actinomyces virocidus Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 120.

**Etymology:** vi.ro.cid'us L. neut. n. virus, slime, poison; L. combining form -cidus of v. caedo, to cut; M.L. adj. virocidus, pertaining to poison (virus) and to cut and intended to refer to the virucidal activity of the organism.

Streptomyces virusinus (Kuchaeva 1958? in Yen and Lu 1964) comb. nov.

**Type strain:** Designation unknown.

**Synonymy:** Actinomyces virusinus Kuchaeva in Yen and Lu 1964, 237.

**Etymology:** vi.rus.in'us L. virus, slime, poison; L. suff. -inus, belonging to, like; M.L. gen. n. virusinus, belonging to virus.

**Remarks:** The 1958 reference of Kuchaeva referred to by Yen and Lu has not been located.

Streptomyces vulgaris (Krasil'nikov 1958) comb. nov.

**Type strain:** (None by original designation); INMII 1034=ATCC 15895 by deposit.

**Synonymy:** Actinomyces vulgaris Nikitina 1957, according to Kostachev 1958, 142. Not validly published.

Actinomyces vulgaris Krasil'nikov 1958, 258.

**Etymology:** vulгар'is L. adj. vulgaris, common.

**Remarks:** Actinomyces vulgaris Krasil'nikov 1958, 258, is incorrectly cited as not validly published in Buchanan, Holt, and Lessel 1966, 65.

Streptomyces xantholithicus (sic) (Konev and Tsyganov 1962) comb. nov.

**Type strain:** LIA 1130/12 (single isolate).

**Synonymy:** Actinomyces xantholithicus (sic) Konev and Tsyganov 1962, 1023 (Eng. transl. 1962, 829).
Etymology: *xantholiticus* Gr. adj. *xanthus*, yellow; Gr. adj. *lytos*, dissolvable, broken; M.L. adj. *xantholiticus*, yellow dissolvable, referring to yellow of vegetative mycelium and tendency of the organism to lyse when maintained on some solid media.

**New Names and New Combinations**

Based on Names First Proposed in non-Russian Literature

**Nocardia aerocolonigenes** (Shinobu and Kawato 1960) comb. nov.

*Type strain*: OBIC 701—NRRL B–3298 (single isolate).


*Etymology*: *aero.colon.i.gen'es* Gr. mas. n. *aer*, air, gas; L. fem. n. *colonia*, settlement, colony; Gr. v. *gen nao*, to produce; M.L. adj. *aerocolonigenes*, producing aerial colonies (so named because of formation of many little colonies on aerial mycelium).

*Remarks*: Whole-cell hydrolyzates contain δ- and/or meso-diaminopimelic acid, D-galactose, and traces of L-arabinose. Consequently, the organism is not a streptomycete (Pridham and Lyons 1969).

**Streptomyces agglomeratus** (Yen 1957) comb. nov.

*Type strain*: Designation unknown.

*Synonymy*: *Actinomyces agglomeratus* Yen 1957, 208.


**Streptomyces ahygroscopicus** (Chiu and Wu 1963) comb. nov.

*Type strain*: Designation unknown.

*Synonymy*: *Actinomyces ahygroscopicus* Chiu and Wu 1963 (page unknown).


*Remarks*: Strains of this taxon reportedly exhibit activity against turnip mosaic virus.

**Streptomyces ansochromeogenes** (Yen and Zhang 1964) subsp. *ansochromeogenes* (Yen and Zhang 1964) comb. nov.

*Type strain*: (None by original designation); IMASP 9–252 (first listed of three strains designated by number, as well as the only strain illustrated and definitively characterized in tables in the manuscript).
Synonymy: *Actinomyces ansoschrodoigenes* Yen and Zhang 1964, 264.

Etymology: *anso.chro*doigenes. Possibly L.n. *ansa*, handle; Gr. n. *chroma*, color; Gr. v. *sul*- *genes*, producing; M.L. adj. *anso-chrodoigenes*, producing a handle of color?, but probably referring to the chromogenicity of the organism and its formation of hooked or looped chains (handles?) of spores.

*Streptomyces ansoschrodoigenes* (Yen and Zhang 1964) subsp. *pallens* (Yen and Zhang 1964) comb. nov.

**Type strain:** IMAFP 9-12 (first listed of seven strains designated by number, as well as the only strain illustrated and definitively characterized in tables in the manuscript).

Synonymy: *Actinomyces ansoschrodoigenes var. pallens* Yen and Zhang 1964, 264.


*Streptomyces atrocyaneus* (Yen and Chou 1964) comb. nov.

**Type strain:** IMAFP B15-27 (single isolate).

Synonymy: *Actinomyces atrocyaneus* Yen and Chou 1964, 428.


*Streptomyces atrolacca*us (Yen 1957) comb. nov.

**Type strain:** Designation unknown.

Synonymy: *Actinomyces atrolacca*us Yen 1957, 171.


*Streptomyces aurantiacogriscus* (Yen 1957) comb. nov.

**Type strain:** Designation unknown.

Synonymy: *Actinomyces aurantiacogriscus* Yen 1957, 209.


*Streptomyces auriscleroticus* nom. nov.

**Type strain:** Designation unknown.


Remarks: It was necessary to coin this new name because *Streptomyces aureus* Waksman and Henrici 1948 has priority. Thirumalachar et al. (1966) stated that the type strain of this taxon was deposited in the ATCC, the CBS, the CMI, and the HCIO. No such taxon is listed in the 1968 ATCC or CBS catalogs of cultures.


Type strain: L.A. 5937=PV 18496 (single isolate).


Remarks: The type strain forms coiled chains of smooth to verrucose-walled spores, is chromogenic, forms gray aerial mycelium, and produces the antibiotic L.A. 5937 complex, a sideromycin-group antibacterial, which does not contain iron.


Type strain: Lilly M48-E2655=NRRL 2773 (single isolate).


Etymology: *capre'ola* O.v. of L. mas. n. *capreolus*, roebuck or chamois, two-pronged like the chamois, bifurcate, but probably derived from some other Latin stem.

Remarks: Whole-cell hydrolyzates contain D- and/or meso-diaminopimelic acid. Consequently, the organism is not a streptomycete and is best classified as a nocardia at this time (Pridham and Lyons 1969).
Streptomyces castaneoglobisporus (Yen 1957) comb. nov.
Type strain: (None by original designation); IMASP A.S. 4.159 (single isolate) in Yen and Zhang 1964, 267.
Etymology: cast.an.e.glo.bi'spo.rus L. fem. n. castanea, chestnut tree, chestnut; L. mas. n. globus, round body; Gr. fem. n. spora, seed; M.L. n. spora, spore; M.L. adj. castaneoglobisporus, chestnutlike and round spored.
Remarks: Yen subsequently renamed this taxon Actinomyces castaneoglobus (sic) in Yen and Zhang (1964), which is illegitimate (Rules 23 and 24, "International Code of Nomenclature of Bacteria").

Streptomyces castaneus (sic) (Yen 1957) comb. nov.
Type strain: (None by original designation); IMASP A.S. 4.174 (single isolate) in Yen and Zhang 1964, 268.
Synonymy: Actinomyces castaneus Yen 1957, 474.
Etymology: cas.ta'ne.us O.v. of L. fem. n. castanea, chestnut tree, chestnut.

Streptomyces cyaneogriseus (Yen 1956) comb. nov.
Type strain: (None by original designation); may be a single isolate subsequently designated as RIA 390=CBS 113.60.
Etymology: cy.an.e.go'ri.se.us Gr. adj. cyanus, dark blue; M.L. adj. griseus, gray; M.L. adj. cyaneogriseus, dark blue gray.

Streptomyces cylindrosporus (Krasil'nikov 1941) Waksman 1953 subsp. picells nom. nov.
Type strain: IMARP B8-35 (single isolate).
Synonymy: Actinomyces cylindrosporus var. atratus (sic) Yen and Chou 1964, 432.
Etymology: cy.lin.dro'spo.rus sub.sp. pi'ce.uls Gr. mas. n. cylindrus, cylinder; Gr. fem. n. spora, seed; M.L. n. spora, spore; M.L. adj. cylindrosporus, cylinder spores; L. adj. piceps, black as pitch; M.L. cylindrosporus subsp. piceps, the pitch-black subspecies of the cylinder-spored streptomycete.
Remarks: It was necessary to change the subspecific epithet of this name to “piceps” because of the previous validly published name Streptomyces atratus Shibata, Higashide, Yamamoto, and Nakazawa 1962, 233 (Rule 7, “International Code of Nomenclature of Bacteria”).

Streptomyces finlayi (Szabó, Marton, Buti, and Pártai 1963) comb. nov.
Type strain: By original designation by Szabó et al. (1963) is R-1-30=FYBA 1869.


**Etymology:** finlay′ M.L. gen. n. finlayi, of Finlay; named in honor of A. C. Finlay, discoverer of oxytetracycline as stated by Szabo et al. (1963).

**Streptomyces flavisceroticus** nom. nov.

*Type strain:* Designation unknown.

*Synonymy:* Chainia flavus Thirumalachar in Thirumalachar and Sukapure 1964, 158.

*Etymology:* flav.iscero.ti.cus L. adj. flavus, yellow; L. neut. n. sclerotium, sclerotium; M.L. adj. flavisceroticus, yellow sclerotium, referring to yellow and ability to produce sclerotia.

*Remarks:* It was necessary to coin this new name because Streptomyces flavus (Krausky 1914) Waksman and Henrici 1948 has priority.

**Streptomyces flavomacrosporus** (Yen 1957) comb. nov.

*Type strain:* Designation unknown.

*Synonymy:* Actinomyces flavomacrosorus Yen 1957, 171.

*Etymology:* flavo.macro.sporus L. adj. flavus, yellow; Gr. adj. macro.sorus, long, large; Gr. n. spora, spore; M.L. n. spora, spore; M.L. adj. flavomacrosorus, yellow, long or large spored.

*Remarks:* One variant of the name of this taxon has been noted in reference Zhur.-Biol. 10: 43110 (1958) as Actinomyces flavo-macrosporus (sic).

**Streptomyces fimigatis scleroticus** nom. nov.

*Type strain:* (None by original designation); CBS 639,66 by deposit in an internationally recognized culture collection.

*Synonymy:* Chainia fimigala Thirumalachar in Thirumalachar, Sukapure, Raibarik, and Gopalkrishna 1966, 10.

*Etymology:* fimiga.ti.scle.ro.ti.cus L. mas. n. fumus, smoke, steam; L. suf. -atus, provided with; L. part. adj. fimigatus, smoked; L. neut. n. sclerotium, sclerotium; M.L. adj. fimigati-scleroticus, smoked sclerotium, referring to smoke color and ability to produce sclerotia.

*Remarks:* Thirumalachar et al. (1966) stated that the type strain was deposited in the ATCC, the CBS, the CMI, and the HC10.

**Streptomyces glomerochromogenes** (Yen and Zhang 1964) comb. nov.

*Type strain:* IAMSP 9-90 (single isolate).

*Synonymy:* Actinomyces glomerochromogenes Yen and Zhang 1964, 263.

*Etymology:* glom.e.ro.chromo.ge.nes L.t.v. glomero, form into ball; Gr. n. chroma, color; Gr. v. suf. -genes, producing; M.L. adj. glomerochromogenes, producing a ball-like color, probably intended to refer to formation of balls or masses of spores and production of dark pigment.
Streptomyces griseoloviolaceus (Yen 1956) comb. nov.

Type strain: Designation unknown.


Etymology: griseo-lovio-laceus, Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. dim. adj. griseolus, somewhat gray; L. adj. violaceus, violet colored; M.L. adj. griseoloviolaceus, somewhat gray violet.

Streptomyces griseus (Krainsky 1914) Waksman and Henrici 1948

subsp. alpha nom. nov.

Type strain: CBS (Ciferri) = NRRL B-2249 by deposit in nationally and internationally recognized culture collections.

Synonymy: Actinomyces albus Krainsky emend. Waksman et Curtis (sic) var. a Ciferri 1927, 83.

Etymology: gris-e-o-lo-vi-o-lace-us, Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. adj. griseus, gray; Gr. n. alpha, first letter of Greek alphabet; M.L. griseus subsp. alpha, subspecies alpha of the gray streptomycete.

Remarks: Ciferri did not designate a type strain of several strains isolated from musty cacao beans (Theobroma cacao L.), but in 1927 he did deposit one strain (CBS (Ciferri)) in the Centraalbureau voor Schimmelcultures, Baarn, Netherlands, and in the American Type Culture Collection, then in Chicago, Ill., U.S.A.

Streptomyces grisells (Krainsky 1914) Waksman and Henrici 1948

subsp. cretaceus nom. nov.

Type strain: CBS (Wollenweber) = NRRL B-2252 (single isolate).

Synonymy: Oospora cretacea Krüger 1890 (page unknown; not verified). Illegitimate.


Actinomyces alb us var. cretaceus (Krüger 1904) Wollenweber 1920, 13.

Actinomyces cretaceus (Krüger 1904) Krasilnikov 1941, 34 (Eng. transl. 1968, 29).

Streptomyces cretaceus (Krüger 1904) Waksman 1950, 143.

Etymology: gris-e-us subsp. cre-tos-us, Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. adj. cretusus, chalky; M.L. griseus subsp. cretaceus, the chalky subspecies of the gray streptomycete.

Remarks: According to Wollenweber (1920), the name "Oospora cretacea" was first proposed by Krüger in 1890. However, Krüger's 1904 description is headed "Oospora cretacea nov. spec." on page 286. The organism originally was isolated from
zonately scabbed beets. It was necessary to coin the new sub-
specific epithet because *Streptomyces crotaceus* (Krüger 1904)
Waksman 1950, 143, has priority.

**Streptomyces griseus** (Krainisky 1914) Waksman and Henrici 1948
subsp. *difficilis* (Yen and Chou 1964) comb. nov.

**Type strain:** (None by original designation); IMASP Y1-11 (first
of two designated strains and the only strain illustrated and
definitively characterized in tables in the manuscript).

**Synonymy:** Actinomyces griseus var. *difficilis* Yen and Chou 1964,
434.

**Etymology:** griseus subsp. difficilis L. adj. griseus, gray; L.
adj. difficilis, difficult; M.L. griseus subsp. difficilis, the difficult
subspecies of the gray streptomycete.

**Streptomyces griseus** (Krainisky 1914) Waksman and Henrici 1948
subsp. *macrosporus* (Yen 1956) comb. nov.

**Type strain:** Designation unknown.

**Synonymy:** Actinomyces griseus *macrosporus* n. subsp. (sic) Yen
1956, 77.

**Etymology:** griseus subsp. macrosporus Old French adj. gris,
gray; Med. L. adj. griseus, gray; M.L. adj. griseus, gray; Gr. adj.
macro, long, large; Gr. n. spora, seed; M.L. spora, spore;
M.L. adj. macrosporus, large spored; M.L. griseus subsp. macro-
sporus, the large-spored subspecies of the gray streptomycete.

**Streptomyces griseus** (Krainisky 1914) Waksman and Henrici 1948
subsp. *segmentosus* (Yen 1956) comb. nov.

**Type strain:** Designation unknown.

**Synonymy:** Actinomyces griseus *segmentosus* n. subsp. (sic) Yen
1956, 77.

**Etymology:** griseus subsp. segmentosus Old French adj. gris,
gray; Med. L. adj. griseus, gray; M.L. adj. griseus, gray; L.n.
segmentum, slice, segment; L. suf. -osus, full of, prone to; M.L.
adj. griseus subsp. segmentosus, the subspecies prone to segment
of the gray streptomycete.

**Streptomyces griseus** (Krainisky 1914) Waksman and Henrici 1948
subsp. *solvificiens* nom. nov., subsp. nov.

**Type strain:** “G” of Welsch = NRRL B-1561 (single isolate se-
lected by Welsch and subsequently distributed).

**Synonymy:** Actinomyces sp. in Welsch 1941, 801, and in earlier
papers.

Actinomyces G in Welsch 1942, 572.

Streptomyces albus G Welsch 1947, 35. Validly pub-
lished.

Actinomyces globisporus albus (Welsch) Krasil'nikov
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1949, 100 (German transl. 1959, 105); or Actinomyces globisporus (Krasil'nikov 1941) subsp. albus (Welsch) Krasil'nikov 1949, 100 (German transl. 1959, 105); or Actinomyces globisporus (Krasil'nikov 1941) subsp. globisporus albus (Welsch) Krasil'nikov 1949, 100 (German transl. 1959, 105). Streptomyces globisporus albus (Krasil'nikov 1949) Pridham, Heseltine, and Benedict 1968, 58.


Etymology: gris'c.us subsp. sol'vi.fa'ci.ens Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. adj. griseus, gray; L.v. solvo, to loosen; L.v. facio, to make; L. part. adj. solvificiens, making loose; M.L. griseus subsp. solvificiens, the making loose subspecies of the gray streptomycete.

Remarks: There is some confusion regarding the original name of this taxon. Welsch (1942) first referred to it as "Actinomyces G." Then he (1947b) used "Streptomyces albus G,;" and he (1947a) called it "the actinomycecin-producing strain 'G' Streptomyces albus." Still later he (1954) referred to it as "Streptomyces albus, souche G." Therefore it appears that the term "G" was intended more as a strain designation than as an integral part of the specific epithet. The epithet "griseus" has priority over "globisporus," and it was necessary to coin a new subspecific epithet because of priority of A. albus subsp. albus and S. albus subsp. albus.

Streptomyces humifer nom. nov.

Type strain: Bristol Labs. C-1292 = ATCC 13748 (single isolate).


Etymology: hu'mi.fer L. adj. humifer, containing moisture, moist. The original epithet "humifera" may have been coined from L.n. humus, soil, and L.v. ferro, to bear, i.e., humifera, soil borne.

Remarks: The type strain contains L-diaminopimelic acid in its whole-cell hydrolyzates; hence it is best classified as a streptomycete (Pridham and Lyons 1969). Schmitz et al. (1962, 1965) presented the first description of this taxon and coined the original specific epithet, "humifera." The name "Streptomyces
"Humifer" is not to be confused with *Actinomyces humiferus* Gledhill and Casida 1969, 114, an entirely different organism. Chains of spores could not be detected nor any aerial mycelium. With the Pridham and Gottlieb (1948) basal agar, the organism does not utilize D-xylose, L-arabinose, or L-rhamnose; it grows poorly on Czapek's solution agar; it exhibits antibacterial and antifungal activity and produces actinogan, an antitumor agent.

**Streptomyces inversochromogenes** (Yen and Zhang 1964) comb. nov.

*Type strain:* IMASP 9-17 (single isolate).

*Synonymy:* *Actinomyces inversochromogenes* Yen and Zhang 1964, 262.

*Etymology:* *inverso.chromo*genes L. part. adj. *inverses,* inverted, changed; Gr. n. *chrome,* color; Gr. v. suf. -genes, producing; M.L. adj. *inversochromogenes,* producing changed color.

**Streptomyces lavendularectus** (Krasil'nikov and Kuchaeva 1960 in Yen and Lu 1964) comb. nov.

*Type strain:* (None by original designation); INMI 1793 (first of five strains numbered, as well as the only strain illustrated and definitively characterized in tables in the manuscript).

*Synonymy:* *Actinomyces lavendularectus* Krasil'nikov and Kuchaeva in Yen and Lu 1964, 238.


*Remarks:* Yen and Lu (1964) ascribed the name *A. lavendularectus* to Krasil'nikov and Kuchaeva 1960 on the basis of a personal communication; hence the name *Actinomyces lavendularectus* Krasil'nikov and Kuchaeva 1960 may not be validly published. A Krasil'nikov and Kuchaeva publication with this name has not been located.

**Streptomyces lilacinus** nom. nov.

*Type strain:* Designation unknown.

*Synonymy:* *Actinomyces lilacinus* Yen 1956, 77.

*Etymology:* *lilaceus* M.L. adj. *lilaceus,* lilac colored.

*Remarks:* It was necessary to change the specific epithet for this taxon because *Streptomyces lilacinus* Nakazawa, Tanabe, Shibata, et al. 1956, 81, is a validly published name and has priority. The taxon apparently is identical with—or related to—*Streptomyces fradiae* (Waksman and Curtis 1916) Waksman and Henrici 1948, 954.

**Streptomyces lilacinofulvis** (Yen and Chou 1964) comb. nov.

*Type strain:* IMASP Y1-1 (first of six designated strains and the only one illustrated and definitively characterized in tables in the manuscript).
Synonymy: *Actinomyces lilacinofulvus* Yen and Chou 1964, 424.

**Etymology:** *lilacin.o* *fulvus* L. adj. *lilacinus*, lilac colored; L. adj. *fulvus*, deep yellow; M.L. adj. *lilacinofulvus*, lilac-colored deep yellow.

*Streptomyces luteolutescens* (Yen 1956) comb. nov.

**Type strain:** Designation unknown. (May be INA 220 according to personal communication between G. F. Gauze and E. B. Shirling.)

**Synonymy:** *Actinomyces luteolutescens* Yen 1956, 77.

**Etymology:** *lute.o* *lute'cs'cens* L. adj. *luteus*, yellow; L. part. adj. *lutescens*, becoming muddy; M.L. part. adj. *luteolutescens*, becoming muddy yellow.

*Streptomyces microsporus* (Yen 1957) comb. nov.

**Type strain:** Designation unknown.

**Synonymy:** *Actinomyces microsporus* Yen 1957, 171.

**Etymology:** *micro*sp'o.ru<s* Gr. adj. *micros*, small; Gr. n. *sporus*, seed; M.L. n. *spora*, spore; M.L. adj. *microsporus*, small spored.

*Streptomyces minutiscerotiticus* (Thirumalachar in Thirumalachar, Rahalkar, Deshmukh, and Sukapure 1965) comb. nov.

**Type strain:** (None by original designation); HACC 147 = ATCC 17757 = ATCC 19346 = CBS 231.65 by deposit in a nationally recognized culture collection; possibly a single isolate.

**Synonymy:** *Chainia minutiscerotica* Thirumalachar in Thirumalachar, Rahalkar, Deshmukh, and Sukapure 1965, 7.

**Etymology:** *mini.ti.sce.ro'ti.cus* L. part. adj. *minus*, small (literally diminished); L. neut. n. *sclerotium*, sclerotium; M.L. adj. *minutiscerotiticus*, small sclerotium.

*Streptomyces nigrogriseolus* (Yen and Chou 1964) comb. nov.

**Type strain:** IMASP B1–12 (first listed of five strains designated, as well as the only strain definitively characterized in tables in the manuscript).

**Synonymy:** *Actinomyces nigrogriseolus* Yen and Chou 1964, 427.


*Streptomyces olivaceiscerotiticus* nom. nov.

**Type strain:** (None by original designation); IMRU 3751 = ATCC 15722 = CBS 296.66 by deposit in an internationally recognized culture collection; probably single isolate.

**Synonymy:** *Chainia olivacea* Thirumalachar in Kalakutskii and Krasil’nikov 1960, 45 (Eng. transl. 1966, 41).

Remarks: See also Thirumalachar and Sukapure (1964).

*Nocardia orientalis* (Pittenger and Brigham 1956) comb. nov.

Type strain: (None by original designation); Lilly M43-05865 = NRRL 2450 = ATCC 19795 (first listed strain of several designated, as well as the strain principally used for characterization of the species).

Synonymy: *Streptomyces orientalis* n. sp. (sic) McCormick, Stark, Pittenger, et al. 1956, 606 (not validly pub.).


Remarks: The type strain contains D- and/or meso-diaminopimelic acid and traces of arabinose and galactose in whole-cell hydrolyzates; hence it is not a streptomycete (Pridham and Lyons 1969). Contrary to statements in Buchanan, Holt, and Lessel 1966, 116, the paper by McCormick et al. does not contain an adequate description of the taxon; hence the name is not validly published in that paper.

*Streptomyces pinedaensis* (Castellani 1964) comb. nov.

Type strain: (None by original designation); CBS 459.65 from Castellani by deposit in an internationally recognized culture collection.

Synonymy: *Nocardia pinedaensis* Castellani 1964, 334.

Etymology: *pinedaensis* M.L. adj. *pinedaensis* (unknown), possibly from Spanish n. *piedra*, stone (disease of the hair characterized by small stony nodules; from French adj. *pie*, of two or more colors in blotches, i.e., pied.

Remarks: The type strain contains L-diaminopimelic acid in whole-cell hydrolyzates; hence it is best classified as a streptomycete at this time (Pridham and Lyons 1969). Castellani (1964) stated that a complete description of the taxon would be given elsewhere. Reference to this later paper is unknown.

*Streptomyces poonensis* (Thirumalachar in Kalakutskii and Krasil’nikov 1960) comb. nov.

Type strain: (None by original designation); IMRU 3752 = ATCC 15723 = CBS 295.66 by deposit in an internationally recognized culture collection.

Etymology: poon.en'sis  M.L. adj. poonensis, pertaining to the city of Poona, India.

Remarks: See also Thirumalachar and Sukapure (1964).

Streptomyces purpurigeniscleroticus nom. nov.
Type strain: (None by original designation); NRRL B-2362 = CBS 409.65 (received directly from Thirumalachar in 1962 as his C-3).
Synonymy: Chainia purpurogena Thirumalachar in Thirumalachar and Sukapure 1964, 165.
Etymology: purpurogen'i.sclerot'i.cus  L. adj. purpureus, purple; Gr. v. suf. -gen'is, producing; L. neut. n. sclerotium, sclerotium; M.L. adj. purpurigeniscleroticus, sclerotium with producing purple, referring to ability to produce purple color and sclerotia.

Streptomyces roseiscleroticus nom. nov.
Type strain: (None by original designation); HACC 144 = ATCC 17755 = CBS 226.65 by deposit in internationally recognized culture collections; probably a single isolate.
Etymology: roseisclerot'i.cus  L. adj. roseus, rose colored; L. neut. n. sclerotium, sclerotium; M.L. adj. roseiscleroticus, sclerotium, rose color, referring to ability to produce rose color and sclerotia.

Remarks: Thirumalachar et al. (1966) stated that the type culture was deposited in the ATCC, the CBS, the CMI, and HC1O.

Streptomyces roseogriseolus (Yen and Chou 1964) comb. nov.
Type strain: IMASP Y3-10 (single isolate).
Synonymy: Actinomyces roseogriseolus Yen and Chou 1964, 426.
Etymology: roseogris'e.o'lus  L. adj. roseus, rose colored; Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. dim. adj. griseolus, somewhat gray; M.L. dim. adj. roseogriseolus, rose colored, somewhat gray.

Streptomyces roseogriseus (Yen and Chou 1964) comb. nov.
Type strain: IMASP Y18-13 (first of two strains designated, as well as the only strain illustrated and definitively characterized in tables in the manuscript).
Etymology: roseogrise'e.us  L. adj. roseus, rose colored; Old French adj. gris, gray; Med. L. adj. griseus, gray; M.L. adj. griseus, gray; M.L. adj. roseogriseus, rose gray.

Remarks: This taxon should not be confused with Streptomyces roseogriseus Boukien in Sobin, Celmer, and Koe, U.S. Patent 3,113,074, December 3, 1963, which is not a validly published name.
Streptomyces rubrolavendulae (Yen 1957) comb. nov.
Type strain: (None by original designation); IMASP 2737 (only strain of six subsequently designated in Yen and Lu 1964, illustrated and definitively characterized in tables in their manuscript).

Synonymy: Actinomyces rubrolavendulae Yen 1957, 209.

Etymology: rub.ro.la.ven'du.lae L. adj. ruber, red; M.L. gen. n. lavendulae, of lavender color; M.L. gen. n. rubrolavendulae, of red lavender.

Nocardia salmonicida (Rucker 1949) comb. nov.
Type strain: (None by original designation); Rucker = Lederle A-7694 = NRRL B-2778 (single isolate).

Synonymy: Streptomyces salmonicida Rucker 1949, 661.

Etymology: sal.mo.ni'ci.da L.n. salmo, salmon; L.v. suf. -cida from L.v. caedo, to cut, kill; M.L. fem. n. salmonicida, salmon killer.

Remarks: For discussion of the reasons for proposing this new combination, see Pridham and Lyons (1969).

Streptomyces sclerotiallus nom. nov.
Type strain: (None by original designation); Thirumalachar ATCC 15721 by deposit in an internationally recognized culture collection.

Synonymy: Chainia antibiotica Thirumalachar 1955, 935.

Etymology: sclero.tial.lus L. neut. n. sclerotium, sclerotium; M.L. adj. sclerotiallus, pertaining to sclerotia.

Remarks: The type strain contains L-diaminopimelic acid in whole-cell hydrolyzates; hence it is best classified as a streptomycete at this time (Pridham and Lyons 1969). The new epithet is given to this taxon to conform to Rule 25 of the “International Code of Nomenclature of Bacteria” (Editorial Board 1966). Based on these studies of the type strain of the type species, the genus Chainia Thirumalachar 1955, 935, is regarded as a putative synonym of Streptomyces Waksman and Henrici 1943, 337.

Streptomyces violaceus-ruber (Waksman and Curtis 1916) comb. nov.
Type strain: IMRU ´3030 = ATCC 14980 (single isolate).


Actinomyces violaceus-ruber (sic) in Waksman and Curtis 1916, 131 (a lapsus calami).

Actinomyces violaceus (sic) in Waksman and Curtis 1916, 110 (a lapsus calami).


**Etymology:** violaceus-ru'ber L. adj. violaceus, violet colored; ru'ber, red; M.L. adj. violaceus-ru'ber, violet red.

**Remarks:** This taxon is further discussed in Pridham et al. (1965), wherein the earliest known specimen—a dried herbarium specimen—is characterized and compared with a presumed type strain (IMRU 3355). Some subjective synonyms also are listed and discussed.
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