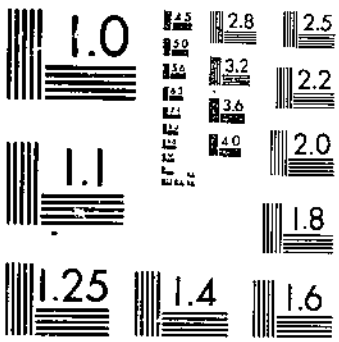
TB-1424-1970 USDA TECHNICAL BULLETINS UPDATA

NEW NAMES AND NEW COMBINATIONS IN THE ORDER ACTINOMYCETALES BUCHANAN 1917.

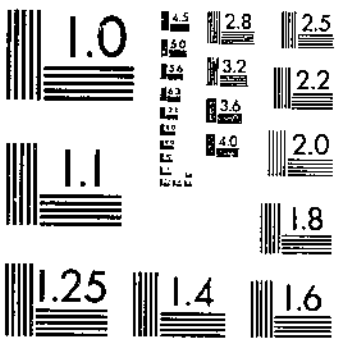
FRIDHAM, T.G.

1 OF 1

START



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

NEW NAMES AND NEW COMBINATIONS IN THE ORDER ACTINOMYCETALES BUCHANAN 1917

By T. G. Pridham

Technical Bulletin No. 1424

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D.C. Issued November 1970

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 35 cents

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.

Contents

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 micro-organisms; (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.

(5) Proposition that production of antibiotics by certain members of the Actinomycetales represents a species determinant (Krasil'nikov 1951, 1956, 1958).

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

(7) 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 micro-organisms 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-

ogy in the early days contributed to present-day confusion with reference to nocardioses, streptothricoses, actinomycosis, 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 syllabications 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
CMI—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 Cryptogamic 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.
NRRL—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

Med. L.—Medieval Latin. Words derived from languages other than Latin that were Latinized during the Middle Ages

M.L.—Modern Latin. A word treated and used as a Latin word, of various derivations but not classic Latin

lapsus calami—a slip of the pen, an error

adj.—adjective
adj. suf.—adjectival suffix
adj. v.—adjectival verb
dim.—diminutive
fem.—feminine gender
gen.—genitive
i.v.—intransitive verb
mas.—masculine gender
n.—noun
neut.—neuter gender
o.v.—orthographic variant
part.—participle
part. adj.—participial adjective
suf.—suffix
sup.—superlative
t.v.—transitive verb
v.—verb

New Names and New Combinations 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: al.bo.hel.va'tus 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. 1966, 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 Lessel 1966, 1094.

Etymology: al'bus subsp. ar.o.mat'i.cus L. adj. *albus*, white; L. adj. *aromaticus*, spicy, aromatic; M.L. *albus* subsp. *aromaticus*, the aromatic subspecies of the white streptomycete.

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).

Synonymy: *Actinomyces albus* subsp. *bruneomycini* Kudrina, Olkhovatova, Murav'yeva, and Gauze 1966, 403.

Etymology: al'bus subsp. brun.e.o.my.cin'i L. adj. *albus*, white; M.L. adj. *bruneus*, dark brown; M.L. suf. *-mycin*, used for many antibiotic names; M.L. gen. n. *bruneomycini*, of bruneomycin; M.L. *albus* subsp. *bruneomycini*, referring to the bruneomycin-producing subspecies of the white streptomycete.

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

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

Synonymy: *Actinomyces albus* var. *fungatus* nov. sp. (sic) Solov'yeva, Rudaya, Bičkova, and Ginsburg 1959, 189 (not validly pub.).

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

Etymology: al'bus subsp. fun.ga'tus L. adj. *albus*, white; L.n. *fungus*, fungus; L. suf. *-atus*, provided with; M.L. adj. *fungatus*, provided with fungus; M.L. *albus* subsp. *fungatus*, the subspecies provided with fungus of the white streptomycete, but probably referring to the antifungal subspecies of the white streptomycete.

Remarks: Three additional names for strain INA 604–36 are given by Solov'yeva and Rudaya (1959): *Actinomyces* 604–36, *Act. albus* 604–36, and *Actinomyces albus* var. *fungus*.

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) Krasil'nikov 1941, 40 (Eng. transl. 1966, 45); **or** *Streptomyces odoratus* (Krasil'nikov 1941) Pridham, Hesseltine, and Benedict 1958, 71 (based on incomplete and inadequate translation of Krasil'nikov's original 1941 monograph); **or** *Actinomyces albus* subsp. *odoratus* Krasil'nikov 1941, 40, *in* Buchanan, Holt, and Lessel 1966, 28.

Etymology: al'bus subsp. o'dor.a'tus 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 Krasil'nikov (1965) and Pridham, Lyons, and Seekinger (1965).

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

Type strain: None designated of several described.

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

Etymology: an.tho.cy.an'e.us Gr. n. *anthos*, flower; Gr. adj. *cyaneus*, 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 Krasil'nikov (1965). The authority for the name *Actinomyces anthocyaneus* may be Novogrudsky (1950). Efforts to obtain a copy of his paper have been unsuccessful.

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

Type strain: (None by original designation); INMI 69 = ATCC 19821 by deposit and subsequent designation by Krasil'nikov for the International *Streptomyces* Project.

Synonymy: *Actinomyces anthocyanicus* Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *in* Krasil'nikov (ed.) 1965, 118.

Etymology: an.tho.cy.an'i.cus Gr. n. *anthos*, flower; presumably based on Gr. adj. *cyaneus*, dark blue; M.L. adj. *anthocyanicus*, 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).

Synonymy: *Actinomyces ashchabadicus* Preobrazhenskaya 1966, 857.

Etymology: ash.cha.bad'i.cus M.L. adj. *ashchabadicus*, belonging to Ashkhabad, a city of the Turkoman Republic of central Asia.

Streptomyces atroolivaceus (Preobrazhenskaya, Blinov, and Ryabova *in* Gauze (ed.) 1957) Pridham, Hesseltine, and Benedict 1958 **subsp. *mutomycini*** (Gauze, Maksimova, Popova, et al. 1959) comb. nov.

Type strain: INA 4305 (single isolate).

Synonymy: *Actinomyces atroolivaceus* Preobrazhenskaya, Blinov, and Ryabova *in* Gauze (ed.) 1957 var. *mutomycini* Gauze, Maksimova, Popova, et al. 1959, 21.

Etymology: at.ro.o.li.va'ce.us subsp. mu.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. *muto*, 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 aureocirculatus (Krasil'nikov and Yuan *in* Krasil'nikov (ed.) 1965) comb. nov.

Type strain: INMI 735 (single isolate).

Synonymy: *Actinomyces aureocirculatus* Yuan 1962, 188. Not validly published.

Actinomyces aureocirculatus Krasil'nikov and Yuan *in* Krasil'nikov (ed.) 1965, 33.

Etymology: au.re.o.cir.cu.la'tus L. neut. n. *aurum*, gold; L. part. adj. *circulatus*, curled; M.L. adj. *aureocirculatus*, golden curled.

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

Type strain: INMI 5008 by original designation.

Synonymy: *Actinomyces aureomonopodiales* Krasil'nikov and Yuan *in* Krasil'nikov (ed.) 1965, 33.

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.

Remarks: Strain INMI 5008 originally was named *Actinomyces longissimus rameus* (sic) by Yuan *in* Konova (1962). This name was not validly published. Subsequently strain INMI 5008 was named *Actinomyces aureomonopodiales.*

Streptomyces aureoverticillatus (Krasil'nikov and Yuan 1960) comb. nov.

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

Synonymy: *Actinomyces aureoverticillatus* Krasil'nikov and Yuan 1960, 487 (Eng. transl. 1960, 354).

Etymology: au.re.o.ver.ti.cil.la'tus L. neut. n. *aurum,* gold; L. mas. n. *verticillus,* whorl; M.L. adj. *verticillatus,* whorled; M.L. adj. *aureoverticillatus,* golden whorled.

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

Streptomyces aurigineus (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.

Synonymy: *Actinomyces aurigineus* Krasil'nikov, Korenyako, and Nikitina *in* Krasil'nikov (ed.) 1965, 220.

Etymology: au.ri.gi'ne.us 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: ba.cil'lar.is L. dim. n. *bacillum,* small rod; M.L.n. *bacillus,* rodlet; L. adj. suf. *-aris,* 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.

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. *chlorus,* greenish yellow, green; Gr. n. *bios,* life; M.L. part. adj. *chlorobiens,* living greenish yellow.

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

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

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

Etymology: chry'se.us Gr. adj. *chryseos,* golden; M.L. adj. *chryseus,* golden.

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

Type strain: (None by original designation); INMI 2292 = RIA 648 = ATCC 15858 = ATCC 23898 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, 59.

Etymology: cit're.o.flu.o.res'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. citrofluorescens* (sic), a lapsus calami.

Streptomyces coelescens (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–Я=ATCC 19833 by deposit in an internationally recognized culture collection and by subsequent designation by Krasil'nikov for the International *Streptomyces* Project.

Synonymy: *Actinomyces coeliatus* Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *in* 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.

Etymology: coe.li'co.lor subsp. coe.li'co.fe'rus L.n. *caelum,* sky; L.n. *color,* color; M.L. adj. *coelicolor,* sky colored; L.n. *caelum,* sky; probably L.n. *color,* color; L. adj. suf. *-ferus,* bearing; M.L. adj. *coelicoferus,* bearing (having) sky (blue) color; M.L. *coelicolor* subsp. *coelicoferus,* the sky (blue) colored subspecies of the sky (blue) streptomycete.

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.

Etymology: coe.li'co.lor subsp. coe.li'co.la'tus L.n. *caelum,* sky; L.n. *color,* color; M.L. adj. *coelicolor,* sky colored; L.n. *caelum,* sky; L.n. *color,* color; L. adj. suf. *-atus,* provided with; M.L.

adj. *coelicolatus,* provided with sky color; M.L. *coelicolor* subsp. *coelicolatus,* the subspecies provided with sky (blue) color of the sky (blue)-colored streptomycete.

Streptomyces coelicolor (Müller 1908) Waksman and Henrici 1948 **subsp. *coelicovarians*** (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.

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

Etymology: coe.li'co.lor subsp. coe.li'co.va'ri.ans 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).

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

Etymology: coe.ru'la.tus (sic) subsp. am.y.lo.lyt'i.cus (sic) L. adj. *caeruleus,* dark blue, azure; L. adj. suf. *-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).

Synonymy: *Actinomyces coerulatus anaseuli* (sic) Krasil'nikov, Sorokina, Alferova, and Bezzubenkova 1965, 88.

Etymology: coe.ru'la.tus (sic) subsp. an'a.seul.i L. adj. *caeruleus*, dark blue, azure; L. adj. suf. *-atus*, provided with; M.L. adj. *coerulatus* (sic), provided with dark blue; subspecific epithet of uncertain origin; M.L. *coerulatus* (sic) subsp. *anaseuli*, 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.

Streptomyces 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 coerulatus* (sic) Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *in* Krasil'nikov (ed.) 1965, 86 and 88.

Etymology: coe.ru'la.tus (sic) L. adj. *caeruleus*, dark blue, azure; L. adj. suf. *-atus*, provided with; M.L. adj. *coerulatus*, with dark blue.

Streptomyces coeruleofuscus (sic) (Preobrazhenskaya 1957) Pridham, Hesseltine, and Benedict 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: coe.ru'le.o.fus'cus (sic) subsp. ac.ti.no.my.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. *actinomycini*, of actinomycin; M.L. *coeruleofuscus* (sic) subsp. *actinomycini*, referring to the actinomycin-producing subspecies of the dark-blue, tawny streptomycete.

Streptomyces 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: coe.ru'le.o.ro'se.us (sic) L. adj. *caeruleus*, dark blue, azure; L. adj. *roseus*, rose colored; M.L. adj. *coeruleoroseus* (sic), dark blue rose colored.

Streptomyces cyanoalbus (Krasil'nikov and Agre *in* Rautenshtein (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: cy.an'o.al'bus 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 cyanocolor (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *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 Bezzubenkova *in* Krasil'nikov (ed.) 1965, 100.

Etymology: cy.an.o.col'or Gr. adj. *cyaneus,* dark blue; L.n. *color,* color; M.L. adj. *cyanocolor,* dark blue colored.

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

Type strain: (None by original designation); INMI 1112–7 = ATCC 19836 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 Bezzubenkova *in* Krasil'nikov (ed.) 1965, 100.

Etymology: cy.an.o.ge'nus Gr. adj. *cyaneus,* dark blue; Gr. v. suf. *-genes,* producing; M.L. adj. *cyanogenus,* producing dark blue.

Streptomyces cyanoglomerus (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *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 Bezzubenkova *in* Krasil'nikov (ed.) 1965, 86.

Etymology: cy.an.o.glo'mer.us Gr. adj. *cyaneus,* dark blue; L.t.v. *glomero,* 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.

Streptomyces erythreus (Waksman 1923) Waksman and Henrici 1948 **subsp. *speleomycini*** (Sabo and Preobrazhenskaya 1962) comb. nov.

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

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

Etymology: e.ryth're.us subsp. spe.le.o.my.cin'i Gr. adj. *erythraeus*, red; L.n. *spelaeum*, cave, den; M.L. suf. *-mycin*, for antibiotic names; M.L. gen. n. *speleomycini*, of speleomycin; M.L. *erythreus* subsp. *speleomycini*, 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).

Streptomyces farinosus (Krasil'nikov 1941) Waksman 1953, 84.

Etymology: fa.ri.no'sa L. adj. *farinosus*, mealy.

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 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: INMI 702 (single isolate).

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

Etymology: fla.vo.va.ri.a'bi.lis 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); INMI 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.

Actinomyces fluorescens Krasil'nikov 1958, 258.

Etymology: flu.o.res'cens L.n. *fluor*, flux; M.L.v. *fluoresco*, to fluoresce; M.L. part. adj. *fluorescens*, fluorescing.

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

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

Synonymy: *Actinomyces fulvoviolaceus* Artamonova and Krasil'nikov *in* Rautenshtein (ed.) 1960, 335 (Eng. transl. 1966, 328).

Etymology: ful'vo.vi.o.la'ce.us L. adj. *fulvus*, deep yellow; L. adj. *violaceus*, violet; M.L. adj. *fulvoviolaceus*, deep yellow violet.

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 Taptykova *in* Rautenshtein (ed.) 1960) comb. nov.

Type strain: (None by original designation); VI–16–3 ČSAV= INMI 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.

Synonymy: *Actinomyces oleaceus* Krasil'nikov, Kuchaeva, and Skryabin 1959 (Program of Symp. on Antibiotics, Prague, Czechoslovakia, May 18–23; Sup. to Abs. Commun., but no page number). Not validly published.

Actinomyces fulvoviridis Kuchaeva, Krasil'nikov, Skryabin, and Taptykova *in* Rautenshtein (ed.) 1960, 251 (Eng. transl. 1966, 245).

Actinomyces fulvoviridis n. sp. Kutchayeva, Krasil'nikov, and Skriabin 1960, 58 (not validly pub.).

Etymology: ful'vo.vi'ri.dis 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.

Synonymy: *Actinomyces fumosus* n. sp. Krasil'nikov 1941, 58 (Eng. transl. 1966, 68).

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

Etymology: fu.mo'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 streptomycete and is best classified as a nocardia at this time.

Streptomyces globisporus (Krasil'nikov 1941) Waksman 1953 **subsp. *tundromycini*** (Kovalenkova 1957) comb. nov.

Type strain: Designation unknown.

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

Actinomyces globisporus subsp. *tundromycini* (sic) Kovalenkova 1957, 80, *in* Buchanan, Holt, and Lessel 1966, 43.

Etymology: glo.bis'po.rus subsp. tun.dro.my.cin'i 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 tundromycin; M.L. *globisporus* subsp. *tundromycini*, referring to the tundromycin-producing subspecies of the round-spored streptomycete.

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

Type strain: INMI 1464=ATCC 15866 by original designation by Krasil'nikov and Yuan.

Synonymy: *Actinomyces glomeroaurantiacus* Krasil'nikov and Yuan *in* Krasil'nikov (ed.) 1965, 33 and 50.

Etymology: glo'mer.o.au.ran.ti'a.cus L.t.v. *glomero*, form into ball; L. neut. n. *aurum*, gold; M.L. neut. n. *Aurantium*, generic name of orange; M.L. adj. *glomeroaurantiacus*, orange colored, formed into ball.

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

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

Synonymy: *Microechinospora grisea* Konev, Tsyganov, Minbaev, and Morogov 1967, 309 (Eng. transl. 1967, 254).

Etymology: gris'e.a M.L. adj. *griseus*, gray.

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

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

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

Synonymy: *Actinomyces griseoaurantiacus* Krasil'nikov and Yuan *in* Krasil'nikov (ed.) 1965, 33.

Etymology: gris'e.o.au.ran.ti'a.cus Old French adj. *gris*, gray; Med. L. adj. *griseus*, gray; L. neut. n. *aurum*, gold; M.L. neut. n. *Aurantium*, generic name of orange; M.L. adj. *griseoaurantiacus*, orange colored with gray.

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

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

Synonymy: *Actinomyces* sp., strain No. 15, and others *in* Krasil'nikov, Belozersky, Rautenshtein, et al. 1957, 418 (Eng. transl. 1957, 417).

Actinomyces grisinus Krasil'nikov 1958, 263.

Etymology: gris'i.nus Old French adj. *gris*, gray; Med. L. adj. *griseus*, gray; L. adj. n. suf. *-inus*, belonging to; M.L. adj. *grisinus*, belonging to gray, probably meaning grayish.

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

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

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

Etymology: hel.va'ti.cus 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: her.bes'cens 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 2389 (single isolate).

Synonymy: *Actinomyces herbeus* Krasil'nikov and Yegorova *in* Krasil'nikov (ed.) 1965, 201.

Etymology: her'be.us L. adj. *herbeus*, grass green.

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

Type strain: INMI 10 (single isolate).

Synonymy: *Actinomyces herbiferis* Krasil'nikov and Yegorova *in* Krasil'nikov (ed.) 1965, 198.

Etymology: her.bif'er.is L. adj. *herbifer*, grassy; M.L. gen. adj. *herbiferis*, of grassy, probably meaning green.

Streptomyces indigocolor (Krasil'nikov, Sorokina, Alferova, and Bezzubenkova *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, Alferova, and Bezzubenkova *in* Krasil'nikov (ed.) 1965, 86.

Etymology: in'di.go.co.lor 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.

Synonymy: *Actinomyces iodoformicus* Kirillova and El-Registan *in* Krasil'nikov (ed.) 1965, 311.

Etymology: i.o'do.form.i'cus Gr. n. *ium,* 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); 117=INMI 117=RIA 659=ATCC 15870=ATCC 23925 by deposit and by subsequent designation by Krasil'nikov for the International *Streptomyces* Project.

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

Etymology: jan'thi.nus L. adj. *janthinus* (sic), violet colored.

Remarks: The name also appears as *Actinomyces jantinus* (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.

Remarks: Originally named *Actinomyces lavendulae* by Preobrazhenskaya and Sveshnikova (1957).

Streptomyces lavendulae (Waksman and Curtis 1916) Waksman and Henrici 1948 **subsp. *avireus*** (Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961) comb. nov.

Type strain: IMRU 3516 (single isolate).

Synonymy: *Actinomyces lavendulae avireus* n. subsp. (sic) Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 119.

Etymology: la.ven'du.lae subsp. a.vi're.us M.L.n. *lavendula*, 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.

Streptomyces lavendulae (Waksman and Curtis 1916) Waksman and Henrici 1948 **subsp. *grasserius*** (Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961) comb. nov.

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

Synonymy: *Streptomyces griscolavendus* Sumiki, Sakaguchi, and Asai, Japanese Patent 6296, August 15, 1957. Not validly published.

Actinomyces lavendulae grasserius n. subsp. (sic) Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 119.

Etymology: la.ven'du.lae subsp. gras.se.ri'us M.L.n. *lavendula*, lavender; M.L. gen. n. *lavendulae*, of lavender color; French n. *grasserié*, disease of silkworms; M.L. adj. *grasserius*, "grasserial"; M.L. *lavendulae* subsp. *grasserius*, the "grasserial" subspecies of the lavender-colored streptomycete, referring to the activity of the organism against silkworm jaundice virus (grasserié).

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

Type strain: INA 4518=ATCC 15871=ATCC 23927 (single isolate).

Synonymy: *Actinomyces lavendulocolor* (sic) Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 120.

Etymology: la.ven'du.lo.co.lor M.L.n. *lavendula*, lavender; M.L. gen. n. *lavendulae*, of lavender color; L.n. *color*, color; M.L. adj. *lavendulocolor*, lavender color.

Remarks: This taxon originally was named *Actinomyces lavendulae* by Preobrazhenskaya and Sveshnikova (1957). There are two orthographic variants of the name proposed by Kuchaeva et al. now in the literature. They are *Actinomyces lavendolocolor* (sic) in the original article by Kuchaeva et al. (1961) and

Actinomyces lavendocolor (sic) in Lessel 1968, 6, and Shirling and Gottlieb 1968, 339.

Streptomyces lazureus (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.

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

Etymology: laz.u.re'us O.v. of Low L. *lazurius*, blue, 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.

Actinomyces levoris Krasil'nikov 1958, 258.

Etymology: le.vo'ris 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.

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

Etymology: liv'i.dans L. part. adj. *lividans*, becoming bluish, black, and blue.

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

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

Synonymy: *Actinomyces longissimus* n. sp. Krasil'nikov 1941, 38 (Eng. transl. 1966, 43).

Etymology: lon.gis'si.mus 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* Krass. (1941) Emmend. (sic) by Krasil'nikov and Yuan (1965) and *Actinomyces longissimus rameus* (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).

Synonymy: *Actinomyces malachiticus* Kudrina, Preobrazhenskaya, and Ryabova *in* Gauze (ed.) 1957, 162 (Eng. transl. 1959, 128).

Streptomyces malachitus (sic) (Kudrina, Preobrazhenskaya, and Ryabova *in* Gauze (ed.) 1957) Pridham, Hesseltine, and Benedict 1958, 69 (a lapsus calami).

Etymology: mal.a.chit'i.cus Gr. n. *malache*, 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: mal.a.chit.o.fus'cus 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: mal.a.chit.o.rec'tus 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: mel.li'nus L. adj. *mellitus*, honeyed, sweet; L. adj. *mellinus*, of honeyed, of sweet, referring to honey color.

Streptomyces ochraceisclerotic us nom. nov.

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

Synonymy: *Chainia ochracea* Kuznetsov 1962, 539 (Eng. transl. 1962, 439).

Etymology: och.ra'ce.i.scle.rot'i.cus Gr. n. *ochra,* ocher; M.L. adj. *ochraceus,* like ocher, rust colored; Gr. adj. *sclerus,* hard; M.L. neut. n. *sclerotium,* sclerotium; M.L. adj. *ochraceiscleroticus,* sclerotium with rust color, pertaining to ability to form sclerotia and to rust color.

Streptomyces olivarius (Kuchaeva, 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 Kuchaeva, Krasil'nikov, Skryabin, 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.

Synonymy: *Actinomyces olivarius* Krasil'nikov, Kuchaeva, and Skryabin 1959 *in* Supplement to Abstracts of Program of Symposium on Antibiotics, Prague, Czechoslovakia, May 18–23 (1959), no page number. Not validly published.

Actinomyces olivarius n. sp. (sic) Kuchaeva, Krasil'nikov, Skryabin, and Taptykova *in* Rautenshtein (ed.) 1960. Not validly published (inadequate description comprising only a colored illustration of an agar slant culture and a strain designation on a color plate facing p. 242).

Actinomyces olivarius n. sp. (sic) Kutchayeva, Krasil'nikov, and Skriabin 1960, 58.

Etymology: ol.i.var'i.us L.n. *oliva,* olive; L.n. stem suf. *-arius,* belonging to; M.L. adj. *olivarius,* belonging to olive.

Streptomyces olivoviridis (Kutchayeva, Krasil'nikov, and Skriabin 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.

Synonymy: *Actinomyces olivoviridis* Krasil'nikov, Kuchaeva, and Skryabin 1959 *in* Supplement to Abstracts of Program of Symposium on Antibiotics, Prague, Czechoslovakia, May 18–23 (1959), no page number. Not validly published.

Actinomyces olivoviridis Kutchayeva, Krasil'nikov, and Skriabin 1960, 58.

Etymology: ol.i.vo.vir'i.dis L.n. *oliva,* olive; L. adj. *viridis,* green; M.L. adj. *olivoviridis,* olive green.

Remarks: One orthographic variant of the specific epithet of this taxon has been noted in the literature, i.e., *Act. olivovirilis* (sic), a lapsus calami on page 248 of the paper by Kuchaeva, Krasil'nikov, Skryabin, and Taptykova *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: INMI 367 (single isolate).

Synonymy: *Actinomyces pneumonicus* Krasil'nikov, Nikitina, and Kondrat'eva *in* Rautenshtein (ed.) 1960, 160 (Eng. transl. 1966, 157).

Etymology: pneu.mon'i.cus Gr. n. *pneumon*, lungs; M.L. fem. 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, Taptykova, and Gesheva 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.

Actinomyces pseudovenezuelae Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 114.

Etymology: pseu.do.ven.e.zue'lae 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 Kostachev 1958, 142. Not validly published.

Actinomyces raffinosus Krasil'nikov 1958, 258.

Etymology: raf.fi.nos'us 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).

Synonymy: *Actinomyces violaceus* var. *rectus* Krasil'nikov and Khusein *in* Krasil'nikov (ed.) 1965, 140. Not validly published. Listing only.

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

Etymology: rec'ti.vi.o.la'ce.us L. adj. *rectus*, straight; L.adj. *violaceus*, violet colored; M.L. adj. *rectiviolaceus*, 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.

Synonymy: *Actinomyces robefuscus* Krasil'nikov and Vinogradova *in* Rautenshtein (ed.) 1960, 223 (Eng. transl. 1966, 218).

Etymology: ro.be.fus'cus Gr. n. *robur*, strength, literally hard wood, e.g., oak; L. adj. contraction "*e*" of L. adj. suf. *-eus*, sometimes denoting similarity; L. adj. *fuscus*, dark or tawny; M.L. adj. *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.

Synonymy: *Actinomyces robeus* Krasil'nikov and Vinogradova *in* Rautenshtein (ed.) 1960, 223 (Eng. transl. 1966, 218).

Etymology: ro'be.us Gr. n. *robur*, strength, literally hard wood, e.g., oak; L. adj. suf. *-eus*, sometimes denoting similarity; M.L. adj. *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.

Synonymy: *Actinomyces robustrus* Krasil'nikov and Vinogradova *in* Rautenshtein (ed.) 1960, 222–223 (Eng. transl. 1966, 218–219).

Etymology: ro.bus'trus Gr. n. *robur*, strength, literally hard wood, e.g., oak; contraction "*us*" of L. adj. suf. *-eus*, sometimes denoting similarity; M.L. adj. *robustrus*, 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 violaceolatus* (p. 28).

Streptomyces rubro-cyaneus (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.

Synonymy: *Actinomyces rubro-cyaneus* Krasil'nikov and Khusein *in* Krasil'nikov (ed.) 1965, 133 and 158.

Etymology: rub.ro-cy.an'e.us L. adj. *ruber*, red; Gr. adj. *cyaneus*, dark blue; M.L. adj. *rubro-cyaneus*, red-dark blue.

Streptomyces spinosus (Preobrazhenskaya 1966) comb. nov.

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

Synonymy: *Actinomyces spinosus* Preobrazhenskaya 1966, 856.

Etymology: spi.no'sus L. adj. *spinosus*, thorny, prickly.

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

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

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

Etymology: sub.fla'vus L. prefix *sub-*, less than, somewhat; L. adj. *flavus*, yellow; L. adj. *subflavus*, yellowish.

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.

Synonymy: *Actinomyces syringae* Kuchaeva, Krasil'nikov, Taptykova, and Gesheva 1961, 113.

Etymology: sy.rin'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). Hütter (1964) also listed an *A. syringi*, which should not be confused with this taxon and repre-

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.

Synonymy: *Actinomyces tauricus* Ivanitskaya, Upiter, Sveshnikova, and Gauze 1966, 974.

Etymology: tau'ri.cus 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 (Kudrina and Maksimova 1963) comb. nov.

Type strain: None designated of 10 to 17 studied.

Synonymy: *Actinomyces thermoflavus* Kudrina and Maksimova 1963, 626 (Eng. transl. 1963, 534).

Etymology: ther.mo.fla'vus 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.

Synonymy: *Actinomyces tian-schanicus* Novogrudsky 1950, 14–25.

Etymology: ti.an-schan'i.cus Kasakh *Tien Shan (Tyanshan)*, mountain range in Kazakh S.S.R.; M.L. adj. *tian-schanicus*, of Tien Shan.

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.cus L.n. *toxicum*, poison; M.L. adj. *toxicus*, toxic.

Streptomyces tumemucerans (Krasil'nikov and Koveshnikov 1962) comb. nov.

Type strain: INMI P–42 (single isolate) and by original designation by Krasil'nikov and Koveshnikov.

Synonymy: *Actinomyces tumemacerans* Krasil'nikov and Koveshnikov 1962, 589 (Eng. transl. 1962, 483).

Etymology: tu.me.mac'er.ans L.i.v. *tumeo*, swell, form tumor; L. part. adj. *macerans*, softening by steeping, to ret; M.L. part. adj. *tumemacerans*, softening a tumor.

Streptomyces valynus (sic) (Preobrazhenskaya 1966) comb. nov.

Type strain: INA 612 by original designation by Preobrazhenskaya 1966, 857.

Synonymy: *Actinomyces valynus* (sic) Preobrazhenskaya 1966, 856.

Etymology: val.y'nus Unknown; possibly from L. adj. *velinus*, 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."

Actinomyces violaceochromogenes (Krasil'nikov 1949 (sic)) Ryabova and Preobrazhenskaya *in* Gauze (ed.) 1957, 183 (Eng. transl. 1959, 145).

Actinomyces violochromogenes Artamonova and Krasil'nikov *in* Rautenshtein 1960, 334 (Eng. transl. 1966, 327). Illegitimate; Rule 24, "International Code of Nomenclature of Bacteria."

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

Remarks: Strain INMI 2929 = RIA 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 INMI 2929 must simply be considered as only another strain of the taxon *A. violaceochromogenes*.

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

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

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

Etymology: vi.o.la'ce.o.la'tus L. adj. *violaceus*, violet; L. adj. *latus*, broad; M.L. adj. *violaceolatus*, violet broad (quite violet).

Remarks: See remarks under *Streptomyces robustrus*.

Streptomyces violaceus (Rossi Doria 1891) Waksman 1953 **subsp. *confinus*** (sic) (Artamonova and Krasil'nikov *in* Rautenshtein (ed.) 1960) comb. nov.

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

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

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

Streptomyces violaceus (Rossi Doria 1891) Waksman 1953 **subsp. *vicinus*** (Artamonova and Krasil'nikov *in* Rautenshtein (ed.) 1960) comb. nov.

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 vicinus* 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. *vicinus*, neighboring, near; M.L. *violaceus* subsp. *vicinus*, the near subspecies of the violet streptomycete.

Streptomyces violaceus-niger (Waksman and Curtis 1916) Pridham, Hesseltine, and Benedict 1958 **subsp. crystallomycini** (Gauze, Preobrazhenskaya, Kovalenkova, et al. 1957) comb. nov.

Type strain: Designation unknown.

Synonymy: *Actinomyces violaceoniger* var. *crystallomycini* (sic) Gauze, Preobrazhenskaya, Kovalenkova, et al. 1957, 10.

Etymology: vi.o.la'ce.us-ni'ger subsp. crys'tal.lo.my.cin'i L. adj. *violaceus*, violet; L. adj. *niger*, black; M.L. adj. *violaceus-niger*, violet black; L. mas. n. *crystallum*, crystal; M.L. suf. *-mycin*, used for many antibiotic names; M.L. gen. n. *crystallomycini*, of crystallomycin; M.L. *violaceus-niger* subsp. *crystallomycini*, referring to the crystallomycin-producing subspecies of the violet-black streptomycete.

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.lans' 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* Rautenshtein (ed.) 1960, treated later in this bulletin.

Streptomyces violarus (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 violarus* (sic) Artamonova and Krasil'nikov *in* Rautenshtein (ed.) 1960, 328 (Eng. transl. 1966, 321).

Etymology: vi.o.la'rus L. fem. n. *viola*, violet; o.v. of M.L. adj. *violaris* (sic), *violarus*, pertaining to violet.

Remarks: Strain INMI 1212 also is designated as the type strain for *Chainia violens* Kalakutskii and Krasil'nikov *in* Rautenshtein (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 violaris* (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: vi.o.la'tus L. fem. n. *viola*, violet; M.L. adj. *violatus*, provided with violet.

Streptomyces violens (Kalakutskii and Krasil'nikov *in* Rautenshtein (ed.) 1960) comb. nov.

Type strain: INMI 1212=ATCC 15898 (single isolate).

Synonymy: *Chainia violens* Kalakutskii and Krasil'nikov *in* Rautenshtein (ed.) 1960, 55 (Eng. transl. 1966, 51).

Etymology: vi.o.lens' L. adj. *violens*, raging, but probably from L. fem. n. *viola*, violet, referring to pink to violet pigment produced by the organism with some media.

Remarks: This organism reportedly produces sclerotia. INMI 1212 also is designated as a strain number for *Actinomyces violarus* (Artamonova and Krasil'nikov *in* Rautenshtein (ed.) 1960, 328) treated earlier in this bulletin. The epithet "*violens*" 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: INMI 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'is 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: INMI 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.n. *virus*, slime, poison; L. suf. *-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); INMI 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: vul.gar'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, 66.

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

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

Synonymy: *Actinomyces xantholiticus* (sic) Konev and Tsyganov 1962, 1023 (Eng. transl. 1962, 829).

Etymology: xan.tho.lit'i.cus 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: OEU 701=NRRL B-3298 (single isolate).

Synonymy: *Streptomyces aërocolonigenes* Shinobu and Kawato 1960, 215.

Etymology: a.er.o.co.lo'ni.ge.nes Gr. mas. n. *aër*, air, gas; L. fem. n. *colonia*, settlement, colony; Gr. v. *gennaio*, to produce; M.L. adj. *aërocolonigenes*, producing aerial colonies (so named because of formation of many little colonies on aerial mycelium).

Remarks: Whole-cell hydrolyzates contain D- 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.

Etymology: ag.glom.er.a'tus L.v. *agglomero*, to agglomerate; L. part. adj. *agglomeratus*, agglomerated.

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

Type strain: Designation unknown.

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

Etymology: a.hy.gro.scop'i.cus Gr. adj. *ahygrus*, nonmoist; Gr. n. *scopus*, watcher; M.L. adj. *ahygroscopicus*, not hygroscopic, not covered with moisture, not detecting moisture.

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

Streptomyces ansochromogenes (Yen and Zhang 1964) **subsp. *ansochromogenes*** (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 ansochromogenes* Yen and Zhang 1964, 264.

Etymology: an.so.chro.mo'ge.nes Possibly L.n. *ansa*, handle; Gr. n. *chroma*, color; Gr. v. suf. *-genes*, producing; M.L. adj. *ansochromogenes*, 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 ansochromogenes (Yen and Zhang 1964) **subsp. *pallens*** (Yen and Zhang 1964) comb. nov.

Type strain: IMASP 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 ansochromogenes* var. *pallens* Yen and Zhang 1964, 264.

Etymology: an.so.chro.mo'ge.nes subsp. pal'lens Possibly L.n. *ansa*, handle; Gr. n. *chroma*, color; Gr. v. suf. *-genes*, producing; M.L. adj. *chromogenes*, producing color; M.L. adj. *ansochromogenes*, producing a handle color?, but probably referring to the chromogenicity of the organism and its formation of hooked or looped chains (handles?) of spores; L. adj. *pallens*, pale, greenish; M.L. *ansochromogenes* subsp. *pallens*, the pale or greenish subspecies of the hooked, looped, and chromogenic streptomycete.

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

Type strain: IMASP B15–27 (single isolate).

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

Etymology: at.ro.cy.an'e.us L. adj. *ater*, black; Gr. adj. *cyaneus*, dark blue; M.L. adj. *atrocyaneus*, blackish dark blue.

Streptomyces atrolaccus (Yen 1957) comb. nov.

Type strain: Designation unknown.

Synonymy: *Actinomyces atrolaccus* Yen 1957, 171.

Etymology: at.ro.lac'cus L. adj. *ater*, black; o.v. of L. adj. *laccatus*, shining, or English "laccate," varnished, or Italian *lacca;* M.L. adj. *atrolaccus*, black shining.

Streptomyces aurantiacogriseus (Yen 1957) comb. nov.

Type strain: Designation unknown.

Synonymy: *Actinomyces aurantiacogriseus* Yen 1957, 209.

Etymology: au.ran.ti.a.co.gris'e.us L. neut. n. *aurum*, gold; M.L. neut. n. *Aurantium*, generic name of orange; M.L. adj. *aurantiacus*, orange colored; M.L. adj. *griseus*, gray; M.L. adj. *aurantiacogriseus*, orange gray.

Streptomyces auriscleroticus nom. nov.

Type strain: Designation unknown.

Synonymy: *Chainia aurea* Thirumalachar *in* Thirumalachar, Sukapure, Rahalkar, and Gopalkrishnan 1966, 11.

Etymology: au.ri.scle.rot'i.cus L. adj. *aureus*, golden; L. neut. n. *sclerotium*, sclerotium; M.L. adj. *auriscleroticus*, golden sclerotium, referring to golden color and ability to produce sclerotia.

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.

Streptomyces bobili (Waksman and Curtis 1916) Waksman and Henrici 1948 **subsp. *sporificans*** nom. nov.

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

Synonymy: *Streptomyces* sp., strain L.A. 5937 *in* Sensi and Timbal 1959, 160.

Streptomyces bobiliae (Waksman and Curtis 1916) Waksman and Henrici 1948 subsp. *sporificans* Sensi and Pagani *in* British Patent 920,799, March 13, 1963 (not validly pub., Rule 11, "International Code of Nomenclature of Bacteria").

Etymology: bo.bi'li subsp. spo.rif'i.cans M.L. gen. n. *bobili*, of Bobili (named for Bobili, person's nickname); Gr. n. *spora*, seed; M.L.n. *spora*, spore; L.v. *facio*, to make; M.L. adj. suf. *-ficans*, producing; M.L. part. adj. *sporificans*, making spores; M.L. *bobili* subsp. *sporificans*, the spore-making subspecies of *Streptomyces bobili*.

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.

Nocardia capreola (Higgens *in* Stark, Higgens, Wolfe, et al. 1963) comb. nov.

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

Synonymy: *Streptomyces capreolus* Higgens *in* Stark, Higgens, Wolfe, et al. 1963, 596.

Etymology: ca.pre'o.la 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.

Synonymy: *Actinomyces castaneoglobisporus* Yen 1957, 208.

Etymology: cas.ta'ne.o.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 castaneoglobosus* (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.

Synonymy: *Actinomyces cyaneogriseus* Yen 1956, 77.

Etymology: cy.an.e.o.gris'e.us Gr. adj. *cyaneus*, dark blue; M.L. adj. *griseus*, gray; M.L. adj. *cyaneogriseus*, dark blue gray.

Streptomyces cylindrosporus (Krasil'nikov 1941) Waksman 1953 **subsp. *piceus*** nom. nov.

Type strain: IMASP BS-35 (single isolate).

Synonymy: *Actinomyces cylindrosporus* var. *atratus* (sic) Yen and Chou 1964, 432.

Etymology: cy.lin.dro'spo.rus subsp. pi'ce.us Gr. mas. n. *cylindrus*, cylinder; Gr. fem. n. *spora*, seed; M.L.n. *spora*, spore; M.L. adj. *cylindrosporus*, cylinder spores; L. adj. *piceus*, black as pitch; M.L. *cylindrosporus* subsp. *piceus*, the pitch-black subspecies of the cylinder-spored streptomycete.

Remarks: It was necessary to change the subspecific epithet of this name to "*piceus*" 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=FBUA 1869.

Synonymy: *Actinomyces finlayi* Szabó, Marton, Buti, and Pártai 1963, 207.

Etymology: fin.lay'i M.L. gen. n. *finlayi*, of Finlay; named in honor of A. C. Finlay, discoverer of oxytetracycline as stated by Szabó et al. (1963).

Streptomyces flaviscleroticus nom. nov.

Type strain: Designation unknown.

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

Etymology: fla.vi.scle.rot'i.cus L. adj. *flavus*, yellow; L. neut. n. *sclerotium*, sclerotium; M.L. adj. *flaviscleroticus*, yellow sclerotium, referring to yellow and ability to produce sclerotia.

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

Streptomyces flavomacrosporus (Yen 1957) comb. nov.

Type strain: Designation unknown.

Synonymy: *Actinomyces flavomacrosporus* Yen 1957, 171.

Etymology: fla.vo.mac.ro.spo'rus L. adj. *flavus*, yellow; Gr. adj. *macrus*, long, large; Gr. n. *spora*, seed; M.L.n. *spora*, spore; M.L. adj. *flavomacrosporus*, 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 flavomacrosporeus* (sic).

Streptomyces fumigatiscleroticus nom. nov.

Type strain: (None by original designation); CBS 639.66 by deposit in an internationally recognized culture collection.

Synonymy: *Chainia fumigata* Thirumalachar *in* Thirumalachar, Sukapure, Rahalkar, and Gopalkrishnan 1966, 10.

Etymology: fu.mi.ga'ti.scle.rot'i.cus L. mas. n. *fumus*, smoke, steam; L. suf. *-atus*, provided with; L. part. adj. *fumigatus*, smoked; L. neut. n. *sclerotium*, sclerotium; M.L. adj. *fumigatiscleroticus*, 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 HCIO.

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

Type strain: IMASP 9-90 (single isolate).

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

Etymology: glo'mer.o.chro.mo'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.

Synonymy: *Actinomyces griseoloviolaceus* Yen 1956, 77.

Etymology: gris.e.o'lo.vi.o.la'ce.us. 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. α Ciferri 1927, 83.

Etymology: gris.e.o'lo.vi.o.la'ce.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 griseus (Krainsky 1914) Waksman and Henrici 1948 **subsp. *cretosus*** nom. nov.

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

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

Oospora cretacea Krüger 1904, 286 (verified). Illegitimate.

Actinomyces albus var. *cretaceus* (Krüger 1904) Wollenweber 1920, 13.

Actinomyces cretaceus (Krüger 1904) Krasil'nikov 1941, 34 (Eng. transl. 1966, 39).

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. *cretosus,* chalky; M.L. *griseus* subsp. *cretosus,* the chalky subspecies of the gray streptomycete.

Remarks: According to Wollenweber (1920), the name "*Oöspora 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 subspecific epithet because *Streptomyces cretaceus* (Krüger 1904) Waksman 1950, 143, has priority.

Streptomyces griseus (Krainsky 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: gris'e.us subsp. dif.fic'i.lis M.L. adj. *griseus*, gray; L. adj. *difficilis*, difficult; M.L. *griseus* subsp. *difficilis*, the difficult subspecies of the gray streptomycete.

Streptomyces griseus (Krainsky 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: gris'e.us subsp. mac.ro.spo'rus Old French adj. *gris*, gray; Med. L. adj. *griseus*, gray; M.L. adj. *griseus*, gray; Gr. adj. *macrus*, long, large; Gr. n. *spora*, seed; M.L.n. *spora*, spore; M.L. adj. *macrosporus*, large spored; M.L. *griseus* subsp. *macrosporus*, the large-spored subspecies of the gray streptomycete.

Streptomyces griseus (Krainsky 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: gris'e.us subsp. seg.men.tos'us 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 (Krainsky 1914) Waksman and Henrici 1948 **subsp. *solvifaciens*** nom. nov., subsp. nov.

Type strain: "G" of Welsch = NRRL B–1561 (single isolate selected 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 published.

Actinomyces globisporus albus (Welsch) Krasil'nikov

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, Hesseltine, and Benedict 1958, 58.

Streptomyces globisporus var. *albus* (Krasil'nikov) Pridham, Hesseltine, and Benedict 1958, 58, *in* Buchanan, Holt, and Lessel 1966, 1044.

Etymology: gris'e.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. *solvifaciens*, making loose; M.L. *griseus* subsp. *solvifaciens*, 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 actinomycetin-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).

Synonymy: *Nocardia humifera in* Schmitz, Hooper, Lein, and Heinemann, West German Patent 1,197,194, July 22, 1965. Not validly published, Rule 11, "International Code of Nomenclature of Bacteria."

Actinomyces sp. ATCC 13748 *in* Lessel (ed.) 1968, 6.

Actinomycete ATCC 13748 *in* Schmitz, Hooper, Lein, and Heinemann, U.S. Patent 3,060,099, October 23, 1962.

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. *fero*, 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: in.ver'so.chro.mo'ge.nes L. part. adj. *inverses,* inverted, changed; Gr. n. *chroma,* 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.

Etymology: la.ven.du.la.rec'tus Med. L. gen. n. *lavendulae,* of lavender color; L. adj. *rectus,* straight; M.L. adj. *lavendularectus,* lavender colored, straight.

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 lilaceus nom. nov.

Type strain: Designation unknown.

Synonymy: *Actinomyces lilacinus* Yen 1956, 77.

Etymology: li.la'ce.us 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 lilacinofulvus (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: li.la'cin.o.ful'vus 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: lu'te.o.lu.tes'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: mic.ro'spo.rus Gr. adj. *micrus*, small; Gr. n. *sporus*, seed; M.L.n. *spora*, spore; M.L. adj. *microsporus*, small spored.

Streptomyces minutiscleroticus (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 minutisclerotica* Thirumalachar *in* Thirumalachar, Rahalkar, Deshmukh, and Sukapure 1965, 7.

Etymology: mi.nu.ti.scle.rot'i.cus L. part. adj. *minutus*, small (literally diminished); L. neut. n. *sclerotium*, sclerotium; M.L. adj. *minutiscleroticus*, 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.

Etymology: ni.gro.gri.se'o.lus L. adj. *niger*, shiny black; Old French adj. *gris*, gray; Med. L. adj. *griseus*, gray; M.L. dim. adj. *griseolus*, somewhat gray; M.L. dim. adj. *nigrogriseolus*, somewhat gray spotted with shiny black.

Streptomyces olivaceiscleroticus 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).

Etymology: o.li.va'ce.i.scle.rot'i.cus L.n. *oliva*, olive; M.L. adj. *olivaceus*, olive colored; L. neut. n. *sclerotium*, sclerotium; M.L. adj. *olivaceiscleroticus*, sclerotium with olive color, referring to olive color and ability to produce sclerotia.

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.).

Streptomyces orientalis n. sp. (sic) Pittenger and Brigham 1956, 642.

Etymology: o.ri.en.tal'is L. mas. n. *oriens*, east; M.L. adj. *orientalis*, pertaining to the east.

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, 1116, 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 piedadensis (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 piedadensis* Castellani 1964, 334.

Etymology: pie'da.den'sis M.L. adj. *piedadensis* (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.

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

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

Remarks: See also Thirumalachar and Sukapure (1964).

Streptomyces purpurogeniscleroticus nom. nov.

Type strain: (None by original designation); NRRL B–2952 = CBS 409.66 (received directly from Thirumalachar in 1962 as his C–3).

Synonymy: *Chainia purpurogena* Thirumalachar *in* Thirumalachar and Sukapure 1964, 165.

Etymology: pur.pur.o.gen'i.scle.rot'i.cus L. adj. *purpureus*, purple; Gr. v. suf. *-genes*, producing; L. neut. n. *sclerotium*, sclerotium; M.L. adj. *purpurogeniscleroticus*, 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.

Synonymy: *Chainia rosea* Thirumalachar *in* Thirumalachar, Sukapure, Rahalkar, and Gopalkrishnan 1966, 10.

Etymology: ro'se.i.scle.rot'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 HCIO.

Streptomyces roseogriseolus (Yen and Chou 1964) comb. nov.

Type strain: IMASP Y3–10 (single isolate).

Synonymy: *Actinomyces roseogriseolus* Yen and Chou 1964, 426.

Etymology: ro'se.o.gris.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).

Synonymy: *Actinomyces roseogriseus* Yen and Chou 1964, 425.

Etymology: ro'se.o.gris'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* Routien *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-7604 = NRRL B-2778 (single isolate).

Synonymy: *Streptomyces salmonicida* Rucker 1949, 661.

Streptoverticillium salmonicida (Rucker 1949) Baldacci, Farina, and Locci 1966, 164.

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 sclerotialus 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: scle.rot.i'a.lus L. neut. n. *sclerotium*, sclerotium; M.L. adj. *sclerotialus*, 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).

Synonymy: *Actinomyces violaceus-ruber* Waksman and Curtis 1916, 127.

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

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

Actinomyces violaceus var. *violaceo-ruber* Baldacci 1944, 178. Validly published, illegitimate. Rule 7, "International Code of Nomenclature of Bacteria."

Streptomyces violaceoruber Waksman *in* Kutzner and Waksman 1959, 535. Validly published, illegitimate. Rule 24b, "International Code of Nomenclature of Bacteria."

Streptomyces albus (Rossi Doria) Waksman and Henrici subsp. *violaceoruber* (Waksman and Curtis) Pridham, Lyons, and Seekinger 1965, 233. Validly published, illegitimate. Rule 7, "International Code of Nomenclature of Bacteria."

Etymology: vi.o.la.ce.us-ru'ber L. adj. *violaceus*, violet colored; L. adj. *ruber*, red; M.L. adj. *violaceus-ruber*, 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.

Literature Cited

ARTAMONOVA, O. I.

1965. [NEW SPECIES OF VIOLET COLORED ACTINOMYCETES—ACTINOMYCES RECTIVIOLACEUS N. SP.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 234–251. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— and KRASIL'NIKOV, N. A.

1960. ACTINOMYCETES OF THE VIOLET GROUP. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 275–337. [Eng. transl. 1966, pp. 274–330.]

BALDACCI, E.

1944. CONTRIBUTO ALLA SISTEMATICA DEGLI ATTINOMICETI: X–XVI—ACTINOMYCES MADURAE; PROACTINOMYCES RUBER; PROACTINOMYCES PSEUDOMADURAE; PROACTINOMYCES POLYCHROMOGENUS; ACTINOMYCES VIOLACEUS; ACTINOMYCES CAERULEUS; CON UN ELENCO ALFABETICO DELLE SPECIE E DELLE VARIETA FINORA STUDIATE. Pavia Univ. Ist. Bot. Atti, Ser. 5, v. 3, pp. 139–193.

———

1958. DEVELOPMENT IN THE CLASSIFICATION OF ACTINOMYCETES. Gior. di Microbiol. 6: 10–17.

——— FARINA, G., and LOCCI, R.

1966. EMENDATION OF THE GENUS STREPTOVERTICILLIUM BALDACCI (1958) AND REVISION OF SOME SPECIES. Gior. di Microbiol. 14: 153–171.

BUCHANAN, R. E.

1917. STUDIES IN THE NOMENCLATURE AND CLASSIFICATION OF THE BACTERIA. II. THE PRIMARY SUBDIVISIONS OF THE SCHIZOMYCETES. Jour. Bact. 2: 155–164.

——— HOLT, J. G., and LESSEL, E. F., JR.

1966. INDEX BERGEYANA. A COMPANION VOLUME TO BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. 1472 pp. Baltimore, Md.

CASTELLANI, A.

1964. MACROULCUS PERSTANS (PERSISTENT MEGALOULCER). Dermatologia 15: 329–338.

CHIU, W.-F., and WU, C.-A.

1963. THE THERAPEUTIC AND PROTECTANT EFFECT OF METABOLITES OF SOME ACTINOMYCES ISOLATES ON INCIDENCE OF A MOSAIC VIRUS DISEASE OF RAPE (*BRASSICA CHINENSIS* L.). Acta Phytopath. Sinica 6: 187–196; Rev. Appl. Mycol. 43: 220 (abs. 1964).

CIFERRI, B.

1927. STUDIEN ÜBER KAKAO. I. UNTERSUCHUNGEN ÜBER DEN MUSSIGEN GERUCH DER KAKAOBOHNEN. Zentbl. f. Bakt., Parasitenk., Infektionskrank. u. Hyg., Abt. II, 71: 80–93.

COUCH, J. N.

1950. ACTINOPLANES, A NEW GENUS OF THE ACTINOMYCETALES. Elisha Mitchell Sci. Soc. Jour. 66: 87–92.

ETTLINGER, L., CORBAZ, R., and HÜTTER, R.

1958. ZUR SYSTEMATIK DER ACTINOMYCETEN. 4. EINE ARTEINTEILUNG DER GATTUNG STREPTOMYCES WAKSMAN ET HENRICI. Arch. f. Mikrobiol. 3, pp. 326–358.

GAUZE, G. F., ed.
1957. PROBLEMS IN THE CLASSIFICATION OF ANTAGONISTIC ACTINOMYCETES. 208 pp. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, 165 pp.]
——— MAKSIMOVA, T. S., POPOVA, O. P., and others.
1959. MUTOMYCIN, A NEW ANTIBIOTIC PRODUCED BY ACTINOMYCES ATROOLIVACEUS. Antibiotiki 4: 20–23.
——— PREOBRAZHENSKAYA, T. P., KOVALENKOVA, V. K., and others.
1957. CRYSTALLOMYCIN, A NEW ANTIMICROBIAL ANTIBIOTIC. Antibiotiki 2: 9–14.
GLEDHILL, W. E., and CASIDA, L. E., JR.
1969. PREDOMINANT CATALASE-NEGATIVE SOIL BACTERIA. II. OCCURRENCE AND CHARACTERIZATION OF ACTINOMYCES HUMIFERUS, SP. N. Appl. Microbiol. 18: 114–121.
GOTTLIEB, D.
1968. DESIGNATION OF TYPE STRAINS OF 47 SPECIES OF ACTINOMYCES (STREPTOMYCES). Internatl. Jour. System. Bact. 18: 19–20.
HARZ, C. O.
1877–78. ACTINOMYCES BOVIS, EIN NEUER SCHIMMEL IN DEN GEWEBEN DES RINDES. Jahresber. d. Thierärzeneisch. Münch. 5: 125–140.
HATT, H. D., and ZVIRBULIS, E.
1967. STATUS OF NAMES OF BACTERIAL TAXA NOT EVALUATED IN INDEX BERGEYANA (1966). Internatl. Jour. System. Bact. 17: 171–225.
HUTCHISON, D., SWART, E. A., and WAKSMAN, S. A.
1949. PRODUCTION, ISOLATION AND ANTIMICROBIAL, NOTABLY ANTITUBERCULOSIS, PROPERTIES OF STREPTOTHRICIN VI. Arch. Biochem. 22: 16–30.
HUTTER, R.
1964. ZUR SYSTEMATIK DER ACTINOMYCETEN. 9. STREPTOMYCETEN MIT CINNAMOMEUS—LUFTMYCEL. Zentbl. f. Bakt., Parasitenk., Infektionskrank. u. Hyg., Abt. II, 117: 603–661.
INTERNATIONAL COMMITTEE ON NOMENCLATURE OF BACTERIA, EDITORIAL BOARD OF JUDICIAL COMMISSION.
1966. INTERNATIONAL CODE OF NOMENCLATURE OF BACTERIA. Internatl. Jour. System. Bact. 16: 459–490.
IVANITSKAYA, L. P., UPITER, G. D., SVESHNIKOVA, M. A., and GAUZE, G. F.
1966. SYSTEMATIC POSITION, VARIATION AND ANTIBIOTIC PROPERTIES OF TAVROMYCETIN PRODUCING ORGANISM. Antibiotiki 11: 973–976.
KALAKUTSKII, L. V.
1963. S. A. WAKSMAN. THE ACTINOMYCETES. Mikrobiologiya 32: 918–922. [Eng. transl. 1963, pp. 779–783.] [Review of v. 1 (1959), v. 2 (1961), v. 3 (1962).]
——— and KRASIL'NIKOV, N. A.
1960. FORMATION OF SCLEROTIA IN ACTINOMYCETES AND THE SYSTEMATIC POSITION OF GENUS CHAINIA. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 45–55. [Eng. transl. 1966, pp. 41–51.]
KIRILLOVA, N. F., and EL-REGISTAN, G. I.
1965. [STUDIES ON ACTINOMYCETES POSSESSING THE SMELL OF IODOFORM.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 310–314. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]
KONEV, Y. E., and TSYGANOV, V. A.
1962. A NEW SPECIES IN THE GROUP OF YELLOW ACTINOMYCES, ACTINOMYCES XANTHOLITICUS N. SP. Mikrobiologiya 31: 1023–1028. [Eng. transl., pp. 829–834.]

KONEV, Y. E., TSYGANOV, V. A., MINDAEV, R., and MOROGOV, V. M.
1967. NEW GENUS OF ACTINOMYCETES—ECHINOSPORA GEN. NOV. Mikrobiologiya 36: 309–317. [Eng. transl., pp. 254–260.]

KONOVA, I. V.
1962. *See* Yuan, C.-s.

KORBNYAKO, A. I., KRASIL'NIKOV, N. A., NIKITINA, N. I., and SOKOLOVA, A. I.
1960. ACTINOMYCETES OF THE FLUORESCENT GROUP. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 133–159. [Eng. transl. 1966, pp. 128–156.]

——— and NIKITINA, N. I.
1965. [NEW SPECIES OF ACTINOMYCETES—ACTINOMYCES FLAVOVARIABILIS.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 294–309. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— SOKOLOVA, A. I., and NIKITINA, N. I.
1959. ACTINOMYCETES OF THE FLUORESCENT GROUP. Program of Symp. on Antibiotics, Prague, Czechoslovakia, May 18-23. Sup., n.p.; Proc., Herold, M., and Gabriel, Z. (eds.), Zdravotnické Nakladatelstvi Státní 1960: 59–60.

KOSTACHEV, A. E.
1958. *See* Nikitina, N. I.

KOVALENKOVA, V. K.
1957. DISSEMINATION OF THE ACTINOMYCES GLOBISPORUS TUNDROMYCINI IN VARIOUS KINDS OF SOIL. Moskov. Obshch. Isp. Prirody, Otd. Biol. Biul. 62: 79–80.

KRAINSKY, A.
1914. DIE AKTINOMYCETEN UND IHRE BEDEUTUNG IN DER NATUR. Zentbl. f. Bakt., Parasitenk., Infektionskrank. u. Hyg., Abt. II, 41: 649–688.

KRASIL'NIKOV, N. A.
1938. RAY FUNGI AND RELATED ORGANISMS—ACTINOMYCETALES. 328 pp. Akad. Nauk, Moskva, S.S.S.R.

———
1941. KEYS TO ACTINOMYCETALES. 147 pp. Akad. Nauk, Moskva-Leningrad, S.S.S.R. Inst. Mikrobiol. [Eng. transl. 1966, 174 pp.]

———
1949. GUIDE TO THE IDENTIFICATION OF BACTERIA AND ACTINOMYCETES. 830 pp. Akad. Nauk, Moskva-Leningrad, S.S.S.R. Inst. Mikrobiol. [German transl. 1959, 813 pp.]

———
1951. [O VNUTRI-I MEZHVIDOVOM ANTAGONIZME U MIKROORGANIZMOV.] Akad. Nauk S.S.S.R. Dok. 77: 117–119.

———
1956. [ON CLASSIFICATION OF RAY FUNGI PRODUCING ANTIBIOTICS.] *In* Kurylowicz, W., Korzybski, T., Kopacka, B., and Kowszyk, Z. (eds.), The Newest Problems From the Field of Antibiotics, Internatl. Symp. Antibiotics, Warsaw, Poland, Feb. 7–13, 1955, pp. 12–19. Natl. Inst. Med. Pub., Warsaw, Poland.

———
1958. THE SIGNIFICANCE OF ANTIBIOTICS AS SPECIFIC CHARACTERISTICS OF ACTINOMYCETES, AND THEIR DETERMINATION BY THE METHOD OF EXPERIMENTAL TRANSFORMATION. Fol. Biol. (Prague) 4: 257–265.

———

1963. TERMINOLOGY OF ACTINOMYCETES AND PROACTINOMYCETES. Mikrobiologiya 32: 988–994. [Eng. transl. 1963, pp. 838–842.]

——— ed.

1965. [BIOLOGY OF SELECTED GROUPS OF ACTINOMYCETES.] 372 pp. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— and AGRE, N. S.

1960. THE WHITE-BLUE GROUP OF ACTINOMYCETES. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 254–274. [Eng. transl. 1966, pp. 252–273.]

——— BELOZERSKY, A. N., RAUTENSHTEIN, Y. I., and others.

1957. THE ANTIBIOTIC GRIZEIN (GRIZEMIN) AND ITS PRODUCERS. Mikrobiologiya 26: 418–425. [Eng. transl., pp. 417–425.]

——— and KHUSEIN, A.

1965. [NEW SPECIES OF ACTINOMYCETES—ACTINOMYCES RUBRO-CYANEUS N. SP.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 133–159. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— KORENYAKO, A. I., and NIKITINA, N. I.,

1965. [ACTINOMYCETES OF THE YELLOW GROUP.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 205–229. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— and KOVESHNIKOV, A. D.

1962. ACTINOMYCES TUMEFACIENS N. SP.—A NEW SPECIES CAUSING DESTRUCTION OF PLANT TUMORS. Mikrobiologiya 31: 589–594. [Eng. transl., pp. 483–486.]

——— KYCHAEVA, A. G., and SKRYABIN, G. K.

1959. ACTINOMYCETES OF THE "OLIVATUS" GROUP. Program of Symp. on Antibiotics, Prague, Czechoslovakia, May 18–23. Sup. to Abs. Commun. n.p.

——— NIKITINA, N. I., and KONDRAT'EVA, I. K.

1960. ACTINOMYCES PNEUMONICUS N. SP.—A NEW SPECIES OF THE GLOBISPORUS GROUP. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 160–169. [Eng. transl. 1966, pp. 157–167.]

——— SOROKINA, E. I., ALFEROVA, V. A., and BEZZUBENKOVA, A. P.

1965. [CLASSIFICATION OF BLUE ACTINOMYCETES.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 74–123. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— and VINOGRADOVA, K. A.

1960. ACTINOMYCETES OF THE CHROMOGENES GROUP. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 202–225. [Eng. transl. 1966, pp. 200–221.]

——— and YEGOROVA, S. A.

1965. [THE GREEN ACTINOMYCETES.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 160–204. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

——— and YUAN, C.-S.

1960. A NEW SPECIES IN THE GROUP OF ACTINOMYCES AURANTIACUS. Mikrobiologiya 29: 482–489. [Eng. transl., pp. 354–358.]

KRASIL'NIKOV, N. A., and YUAN, C-s.

1965. [THE SPECIES COMPOSITION OF ORANGE-COLORED ACTINOMYCETES.] *In* Krasil'nikov, N. A. (ed.), [Biology of Selected Groups of Actinomycetes], pp. 28–57. Izdatel. "Nauka," Moscow, U.S.S.R. [In Russian.]

KRÜGER, F.

1890. [TITLE NOT AVAILABLE.] Versuchstät. Zuckerrohr Ber. West Java, Kergok-Legal; (abs.) Zentbl. f. Bakt., Parasitenk. u. Infektionskrank. 12: 310 (1892).

———

1904. UNTERSUCHUNGEN UBER DEN GÜRTELSCHORF DER ZUCKERRÜBEN. Biol. Reichsanst. f. Land u. Forstw. Arb. 4, pp. 275–318.

KUCHAEVA, A. G. [KUTCHAYEVA, A. G.], KRASIL'NIKOV, N. A., and SKRYABIN, G. K. [SKRIABIN, G. K.]

1960. ACTINOMYCETES OF THE A. OLIVACEUS GROUP. Proc. Symp. on Antibiotics, Prague, Czechoslovakia, May 18–23, 1959, Herold, M., and Gabriel, Z. (eds.), Zdravotnické Nakladatelstvi Státní 1960: 57–58.

——— KRASIL'NIKOV, N. A., SKRYABIN, G. K., and TAPTYKOVA, S. D.

1960. THE OLIVOCHROMOGENOUS GROUP OF ACTINOMYCETES. *In* Rautenshtein, Y. I. (ed.), Biology of Antibiotic-Producing Actinomycetes. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, pp. 226–253. [Eng. transl. 1966, pp. 222–251.]

——— KRASIL'NIKOV, N. A., TAPTYKOVA, S. D., and GESHEVA, R. L.

1961. [ON THE TAXONOMY OF ACTINOMYCES OF THE LAVENDULAE GROUP.] Bulgar. Akad. Nauk Inst. Mikrobiol. Izv. 13: 103–124. [Apparently there is a second publication of this identical article except dated 1962.]

KUDRINA, E. S., and MAKSIMOVA, T. S.

1963. SOME SPECIES OF THERMOPHILIC ACTINOMYCES FROM SOILS OF CHINA AND THEIR ANTIBIOTIC PROPERTIES. Mikrobiologiya 32: 623–631. [Eng. transl., pp. 532–538.]

——— OLKHOVATOVA, O. L., MU'RAV'YEVA, L. I., and GAUZE, G. F.

1966. [SYSTEMATIC POSITION AND VARIATION OF THE ORGANISM PRODUCING BRUNEOMYCIN, AN ANTITUMOR ANTIBIOTIC.] Antibiotiki 11: 400–405.

——— PREOBRAZHENSKAYA, T. P., and RYABOVA, I. D.

1957. CHARACTERISTICS OF ANTAGONISTIC ACTINOMYCETES OF THE CHRYSOMALLUS SERIES. *In* Gauze, G. F. (ed.), Problems in the Classification of Antagonistic Actinomycetes, pp. 162–168. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, pp. 128–133.]

KUTZNER, H. J., and WAKSMAN, S. A.

1959. STREPTOMYCES COELICOLOR MÜLLER AND STREPTOMYCES VIOLACEORUBER WAKSMAN AND CURTIS, TWO DISTINCTLY DIFFERENT ORGANISMS. Jour. Bact. 78: 528–538.

KUZNETSOV, V. D.

1962. A NEW SPECIES OF GENUS CHAINIA. Mikrobiologiya 31: 534–539. [Eng. transl., pp. 435–439.]

LECHEVALIER, H. A., and LECHEVALIER, M. P.

1967. BIOLOGY OF ACTINOMYCETES. Ann. Rev. Microbiol. 21: 71–100.

LESSEL, E. F., JR., ed.

1968. THE AMERICAN TYPE CULTURE COLLECTION. CATALOGUE OF STRAINS. Ed. 8, 200 pp. Rockville, Md.

McCormick, M. H., Stark, W. M., Pittenger, G. E., and others.
1956. VANCOMYCIN, A NEW ANTIBIOTIC. Antibiotics Annu. 1955–56: 606–611.
Maksimova, T. S., and Kovsharova, I. N.
1964. [EARLY IDENTIFICATION OF ACTINOMYCIN ANTIBIOTICS AND THE SYSTEMATIC POSITION OF THEIR PRODUCERS.] Antibiotiki 9: 110–115.
——— Kovsharova, I. N., and Proshlyakova, V. V.
1965. EARLY IDENTIFICATION OF ECHINOMYCINE ANTIBIOTICS AND SYSTEMATIC POSITION OF THEIR PRODUCERS. Antibiotiki 10: 298–304.
Müller, R.
1908. EINE DIPHTHERIDE UND EINE STREPTOTHRIX MIT GLEICHEM BLAUEN FARBSTOFF SOWIE UNTERSUCHUNGEN ÜBER STREPTOTHRIXARTEN IM ALLGEMEINEN. Zentbl. f. Bakt., Parasitenk., Infektionskrank. u. Hyg., Abt. I, Orig., 46: 195–212.
Murat, A.-M., Stinebring, W. R., Schaffner, C. P., and Lechevalier, H.
1959. SCREENING OF ANTIBIOTICS ACTIVE AGAINST INTRACELLULAR BACTERIA. Appl. Microbiol. 7: 109–112.
Nakazawa, K., Tanabe, K., Shibata, M., and others.
1956. STUDIES ON STREPTOMYCETES. CLADOMYCIN, A NEW ANTIBIOTIC PRODUCED BY STREPTOMYCES LILACINUS NOV. SP. Jour. Antibiotics (Tokyo), Ser. B, 9: 81.
Nikitina, N. I.
1958. ACTINOMYCETES OF THE GLOBISPORUS GROUP. (Abs. by A. E. Kostachev of diss. of N. I. Nikitina, Akad. Nauk S.S.S.R. Inst. Mikrobiol., July 12, 1957.) Mikrobiologiya 27: 141–144. [Eng. transl., pp. 141–144.]
Novogrudsky, D. M.
1950. [PRINCIPLES OF SERIES OF ANTIBIOTICS AND ITS SIGNIFICANCE IN FINDING NEW ANTIMICROBIAL SUBSTANCES.] Akad. Nauk Kazakhskoi S.S.R. Izv. Ser. Mikrobiol. 83: 14–25.
Ørskov, J.
1923. INVESTIGATIONS INTO THE MORPHOLOGY OF THE RAY FUNGI. Inaug. Diss. København. 171 pp. Levin and Munksgard, Copenhagen, Denmark.
Pittenger, R. C., and Brigham, R. B.
1956. STREPTOMYCES ORIENTALIS, N. SP., THE SOURCE OF VANCOMYCIN. Antibiotics & Chemother. 6: 642–647.
Preobrazhenskaya, T. P.
1957. CHARACTERISTICS OF ANTAGONISTIC ACTINOMYCETES OF THE COERULESCENS SERIES. *In* Gauze, G. F. (ed.), Problems in the Classification of Antagonistic Actinomycetes, pp. 119–130. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, pp. 95–104.]
———
1966. [CHARACTERISTICS OF ACTINOMYCETES OF AZUREUS SECTION.] Antibiotiki 11: 849–861.
——— Blinov, N. O., and Ryabova, I. D.
1957. CHARACTERISTICS OF ANTAGONISTIC ACTINOMYCETES OF THE GRISEUS SERIES. *In* Gauze, G. F. (ed.), Problems in the Classification of Antagonistic Actinomycetes, pp. 131–145. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, pp. 105–115.]
——— Maksimova, T. S., and Blinov, N. O.
1964. [A STUDY OF GREEN PIGMENTS FROM SOME ACTINOMYCETOUS SPECIES BY THE METHOD OF PAPER CHROMATOGRAPHY.] Antibiotiki 9: 963–970.

PREOBRAZHENSKAYA, T. P., and SVESHNIKOVA, M. A.
1957. CHARACTERISTICS OF ANTAGONISTIC ACTINOMYCETES OF THE LAVENDULAE-ROSEUS SERIES. *In* Gauze, G. F. (ed.), Problems in the Classification of Antagonistic Actinomycetes, pp. 31-50. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, pp. 21–37.]

PRIDHAM, T. G., and GOTTLIEB, D.
1948. THE UTILIZATION OF CARBON COMPOUNDS BY SOME ACTINOMYCETALES AS AN AID FOR SPECIES DETERMINATION. Jour. Bact. 56: 107–114.

——— HESSELTINE, C. W., and BENEDICT, R. G.
1958. A GUIDE FOR THE CLASSIFICATION OF STREPTOMYCETES ACCORDING TO SELECTED GROUPS. PLACEMENT OF STRAINS IN MORPHOLOGICAL SECTIONS. Appl. Microbiol. 6: 52–79.

——— and LYONS, A. J., JR.
1969. PROGRESS IN CLARIFICATION OF THE TAXONOMIC AND NOMENCLATURAL STATUS OF SOME PROBLEM ACTINOMYCETES. Devlpmt. Indus. Microbiol. 10: 183–221.

——— LYONS, A. J., JR., and SECKINGER, H. L.
1965. COMPARISON OF SOME DRIED HOLOTYPE AND NEOTYPE SPECIMENS OF STREPTOMYCETES WITH THEIR LIVING COUNTERPARTS. Internatl. Bul. Bact. Nomencl. and Taxonomy 15: 191–237.

RAUTENSHTEIN, Y. I., ed.
1960. BIOLOGY OF ANTIBIOTIC-PRODUCING ACTINOMYCETES. Akad. Nauk S.S.S.R. Inst. Mikrobiol. Trudy 8, 346 pp. [Eng. transl. 1966, 338 pp.]

ROSSI DORIA, T.
1891. SU DI ALCUNE SPECIE DI "STREPTOTRIX" TROVATE NELL' ARIA STUDIATE IN RAPPORTO A QUELLE GIÀ NOTE E SPECIALMENTE ALL' "ACTINOMYCES." Roma Univ. Ist. Ig. Sper. Ann. 1, pp. 399–438.

RUCKER, R. R.
1949. A STREPTOMYCETE PATHOGENIC TO FISH. Jour. Bact. 58: 659-664.

RYABOVA, I. D., and PREOBRAZHENSKAYA, T. P.
1957. CHARACTERISTICS OF ANTAGONISTIC ACTINOMYCETES OF THE VIOLACEUS SERIES. *In* Gauze, G. F. (ed.), Problems in the Classification of Antagonistic Actinomycetes, pp. 178–197. Medgiz, Moscow, U.S.S.R. [Eng. transl. 1959, pp. 141–156.]

SABO, G., and PREOBRAZHENSKAYA, T. P.
1962. [THE CHARACTERISTICS OF THREE STRAINS OF ACTINOMYCETES, PRODUCERS OF NEW ANTIBIOTICS.] Antibiotiki 7: 312–317.

SCHMITZ, H., HOOPER, I. R., LEIN, J., and HEINEMANN, B.
1962. COMPLEX POLYSACCHARIDE, ACTINOGAN, AND PREPARATION THEREOF. (U.S. Patent 3,060,099, Oct. 23.)

——— HOOPER, I. R., LEIN, J., and HEINEMANN, B.
1965. HERSTELLUNG DES TUMORHEMMENDEN WIRKSTOFFS ACTINOGAN. (West German Patent 1,197,194, July 22.) [Abs. in Indus. Microbiol. Abs. 1 (4): 33–34 (1965).]

SENSI, P., and TIMBAL, M. T.
1959. ISOLATION OF TWO ANTIBIOTICS OF THE GRISEIN AND ALBOMYCIN GROUP. Antibiotics & Chemother. 9: 160–166.

SHIBATA, M., HIGASHIDE, E., YAMAMOTO, H., and NAKAZAWA, K.
1962. STUDIES ON STREPTOMYCETES. PT. I. STREPTOMYCES ATRATUS NOV. SP., PRODUCING NEW ANTITUBERCULOUS ANTIBIOTICS RUFOMYCIN A AND B. Agr. and Biol. Chem. (Tokyo) 26: 228–233.

SHINOBU, R., and KAWATO, M.
1960. ON STREPTOMYCES AEROCOLONIGENES NOV. SP. FORMING THE SECONDARY COLONIES ON THE AERIAL MYCELIA. Bot. Mag. (Tokyo) 73: 212–216.

SHIRLING, E. B., and GOTTLIEB, D.
1968. COOPERATIVE DESCRIPTION OF TYPE CULTURES OF STREPTOMYCES III. ADDITIONAL SPECIES DESCRIPTIONS FROM FIRST AND SECOND STUDIES. Internatl. Jour. System. Bact. 18: 279–392.

SOBIN, B. A., CELMER, W. D., and KOE, B. K.
1963. ANTIMICROBIAL AGENT. (U.S. Patent 3,113,074, Dec. 3.)

SOLOV'YEVA, N. K., and RUDAYA, S. M.
1959. [THE CHARACTERISTICS OF THE PRODUCENT STRAIN OF A NEW ANTIFUNGAL ANTIBIOTIC, ALBOFUNGIN.] Antibiotiki 4: 5–10. [Eng. transl., pp. 659–663.]

——— RUDAYA, S. M., BIČKOVA, M. M., and GINSBURG, G. N.
1959. DESCRIPTION OF THE STRAIN PRODUCING A NEW ANTIFUNGAL ANTIBIOTIC—ALBOFUNGIN—AND THE CONDITIONS FOR ITS SUBMERGED BIOSYNTHESIS. Abs. Commun., Symp. on Antibiotics, Prague, Czechoslovakia, May 18–23, pp. 189–191.

STARK, W. M., HIGGENS, C. E., WOLFE, R. N., and others.
1963. CAPREOMYCIN, A NEW ANTIMYCOBACTERIAL AGENT PRODUCED BY STREPTOMYCES CAPREOLUS SP. N. Antimicrobial Agents Chemother. 1962: 596–606.

SUMIKI, Y., SAKAGUCHI, K., and ASAI, T.
1957. GRASSERIOMYCIN, A NEW ANTIBIOTIC FOR JAUNDICE VIRUS OF BOMBYX MORI. (Japanese Patent 6296, Aug. 15.) [Abs. in Chem. Abs. 52: 20918, 1958.]

SZABÓ, I., MARTON, M., BUTI, I., and PÁRTAI, G.
1963. ACTINOMYCES FINLAYI N. SP. Acta Microbiol. 10: 207–214.

THIRUMALACHAR, M. J.
1955. CHAINIA, A NEW GENUS OF THE ACTINOMYCETALES. Nature 176: 934–935.

——— RAHALKAR, P. W., DESHMUKH, P. V., and SUKAPURE, R. S.
1965. PRODUCTION OF ABURAMYCIN BY CHAINIA MINUTISCLEROTICA, A NEW SPECIES OF ACTINOMYCETE. Hindustan Antibiotics Bul. 8: 6–9.

——— and SUKAPURE, R. S.
1964. STUDIES ON SPECIES OF THE GENUS CHAINIA FROM INDIA. Hindustan Antibiotics Bul. 6: 157–166.

——— SUKAPURE, R. S., RAHALKAR, P. W., and GOPALKRISHNAN, K. S.
1966. STUDIES ON SPECIES OF THE GENUS CHAINIA FROM INDIA. II. Hindustan Antibiotics Bul. 9: 10–15.

TREVISAN, V.
1889. I GENERI E LE SPECIE DELLE BATTERIACEAE. TIPO-LIT. 1. 35 pp. Zanaboni e Gabuzzi, Milano, Italy. [See Internatl. Bul. Bact. Nomencl. and Taxonomy 2: 11–44 (1952) for photographic reproduction of article.]

VETLUGINA, L. A., and SHIGAYEVA, M. K.
1959. [TITLE UNKNOWN.] Akad. Nauk Kazakhskoi S.S.R. Inst. Mikrobiol. i Virusologii Trudy 3, pp. 46–54.

WAKSMAN, S. A.
1923. [ORDER ACTINOMYCETALES.] *In* Bergey, D. H., Harrison, F. C., Breed, R. D., and others, Bergey's Manual of Determinative Bacteriology. 442 pp. Baltimore, Md.

———
1950. THE ACTINOMYCETES. THEIR NATURE, OCCURRENCE, ACTIVITIES, AND IMPORTANCE. Cryptogamici et Phytopath. Ann. 9, 230 pp.

WAKSMAN, S. A.

1953. PT. I. THE ACTINOMYCETES. *In* Waksman, S. A., and Lechevalier, H. A., Guide to the Classification and Identification of the Actinomycetes and Their Antibiotics, pp. 1–162. Baltimore, Md.

———

1964. CLASSIFICATION OF ACTINOMYCETES. Mikrobiologiya 33: 1078–1081. [Eng. transl. 1964, pp. 934–935.]

——— and CURTIS, R. E.

1916. THE ACTINOMYCES OF THE SOIL. Soil Sci. 1: 99–134.

——— and HENRICI, A. T.

1943. THE NOMENCLATURE AND CLASSIFICATION OF THE ACTINOMYCETES. Jour. Bact. 46: 337–341.

——— and HENRICI, A. T.

1948. FAMILY ACTINOMYCETACEAE BUCHANAN AND FAMILY STREPTOMYCETACEAE WAKSMAN AND HENRICI. *In* Breed, R. S., Murray, E. G. D., and Hitchens, A. P. (eds.), Bergey's Manual of Determinative Bacteriology. Ed. 6, pp. 892–980. Baltimore, Md.

WELSCH, M.

1941. BACTERICIDAL SUBSTANCES FROM STERILE CULTURE MEDIA AND BACTERIAL CULTURES. WITH SPECIAL REFERENCE TO THE BACTERIOLYTIC PROPERTIES OF ACTINOMYCETES. Jour. Bact. 42: 801–814.

———

1942. BACTERIOSTATIC AND BACTERIOLYTIC PROPERTIES OF ACTINOMYCETES. Jour. Bact. 44: 571–588.

———

1947a. ACTINOMYCETIN. Jour. Bact. 53: 101–102.

———

1947b. PHÉNOMÈNES D'ANTIBIOSE CHEZ LES ACTINOMYCÈTES. SUP. II. Rev. Belge Path. et Med. Expt. 18: 1–315.

———

1954. ACTIVITÉS STAPHYLOLYTIQUE ET STREPTOLYTIQUE DES FILTRATS DE CULTURE DE STREPTOMYCES SPP. Soc. de Biol. [Paris] Compt. Rend. 148: 604–606.

WOLLENWEBER, H. W.

1920. DER KARTOFFELSCHORF. Forschungsinst. f. Kartoffelbau, Arb. 2, pp. 1–102.

WORK, E.

1949. CHROMATOGRAPHIC INVESTIGATIONS OF AMINO ACIDS FROM MICROORGANISMS. I. THE AMINO ACIDS OF CORYNEBACTERIUM DIPHTHERIAE. Biochim. et Biophys. Acta 3: 400–411.

YEN, H.-c.

1956. CLASSIFICATION AND DETERMINATION OF ACTINOMYCES. Ko-Hsüeh T'ung-Pao 1: 75–78.

———

1957a. [DESCRIPTIONS OF ACTINOMYCES. I.] Ko-Hsüeh T'ung-Pao 6: 171–172.

———

1957b. [DESCRIPTIONS OF ACTINOMYCES. II.] Ko-Hsüeh T'ung-Pao 7: 208–209.

———

1957c. [DESCRIPTIONS OF ACTINOMYCES. IV.] Ko-Hsüeh T'ung-Pao 15: 474–475.

——— and CHOU, H.-c.

1964. DESCRIPTION OF SEVERAL NEW SPECIES AND OF NEW VARIETIES OF ACTINOMYCES. Acta Microbiol. Sinica 10: 424–438.

——— and Lu, Y.-Y.

1964. STUDIES ON THE CLASSIFICATION OF ACTINOMYCES. V. DETERMINATION OF THE GROUP ACTINOMYCES LAVENDULAE. Acta Microbiol. Sinici 10: 236–246.

——— and Zhang, G.-w.

1964. STUDIES ON THE CLASSIFICATION OF ACTINOMYCES. VII. DETERMINATION OF THE GROUP ACTINOMYCES CHROMOGENES. Acta Microbiol. Sinica 10: 258–273.

Yuan, C.-s.

1962. BIOLOGY OF THE GROUP OF ORANGE-COLORED ACTINOMYCETES. (Abs. by I. V. Konova of diss. of C.-s. Yuan, Akad. Nauk S.S.S.R. Inst. Mikrobiol., May 1961.) Mikrobiologiya 31: 188–189. [Eng. transl., pp. 150–151.]

Zyrbulis, E., and Hatt, H. D.

1969. STATUS OF NAMES OF BACTERIAL TAXA NOT EVALUATED IN INDEX BERGEYANA (1966). Internatl. Jour. System. Bact. 19: 57–115.

☆ U. S. GOVERNMENT PRINTING OFFICE 1970 O—398-458

END