New Names and Combinations in the Genera
Bacteroides Castellani and Chalmers, Fusobacterium Knorr, Eubacterium Prévot,
Propionibacterium Delwich, and Lactobacillus Orla-Jensen

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Due to recent studies and to recommendations made by various taxonomic subcommittees, the descriptions of several genera of anaerobic, nonsporing bacilli were emended and a number of species with these characteristics were reclassified. Because the resultant new names and combinations and the author citations for them were not clearly indicated when the new names and combinations were originally introduced, they are listed here for the sake of clarity. In addition, five new combinations (Fusobacterium aquatile, F. stabile, F. perfoetens, Eubacterium endocarditidis, and E. helminthoides) and a new name (Eubacterium helwigiae) are proposed herein.

As a result of studies and recommendations by the International Subcommittee on the Taxonomy of the Anaerobic, Gram-Negative Rods, the definitions of the genera Fusobacterium Knorr and Bacteroides Castellani and Chalmers have been emended. These two genera of anaerobic, gram-negative, nonsporing rods, which include organisms which are nonmotile as well as those which are motile by means of peritrichous flagella, are separated on the basis of differences in their metabolic activities. Members of the genus Fusobacterium produce butyric acid as a major metabolic product, and members of the genus Bacteroides usually do not produce butyric acid. The few species of Bacteroides which produce detectable amounts of butyric acid also produce isobutyric and isovaleric acids, which are not produced by members of the genus Fusobacterium. Following these recommendations, a number of new names and combinations involving species previously placed in the genera Bacteroides, Dialister Bergey et al., Fusobacterium, and Sphaeroaphorus Prévot (a later homonym, hence an illegitimate generic name) were proposed (17, 19, 30, 31, 33).

Similarly, the definition of the genus Eubacterium Prévot has been emended to include anaerobic, gram-positive, nonsporing bacilli that do not produce, as major products of fermentation, (i) propionic acid, (ii) lactic acid alone, or (iii) acetic and lactic acids where the amount of acetic acid exceeds that of the lactic acid. Most species in this genus produce butyric and other acids; some species produce mainly acetic and formic acids and ethanol; a few species do not produce significant amounts of acids or alcohols from carbohydrates or peptone. Eubacterium now includes several species formerly placed in the genus Ramibacterium Prévot, Catenabacterium Prévot, or Cillobacterium Prévot, and a number of new combinations resulted from the transfer of these species to Eubacterium (18, 20).

The type species of the genus Ramibacterium, R. ramosum, is a clostridium (16), and thus the generic name Ramibacterium is illegitimate [Bacteriological Code (reference 21), Rule 17 (c)].

Organisms in the genus Catenabacterium originally were differentiated from those in Eubacterium by the production of long chains and filaments by the former. The original description and illustrations of the type species of Eubacterium, E. foedans Klein (24), include chains and filaments. Also, chain length and filament formation vary with the culture
medium, making these criteria unreliable for differentiation between these two groups. Hence the catenabacteria have been transferred to other genera (17, and see below).

*Cilibacterium* originally included the motile, nonsporing, gram-positive, anaerobic bacilli. Since we have observed nonmotile variants of some motile species of *Cilibacterium*, motility is judged not to be a reliable characteristic for differentiating between *Cilibacterium* and *Eubacterium*, and the cibobacteria have been transferred to the genus *Eubacterium* (18, 20).

Species of anaerobic, gram-positive, nonsporing bacilli that form lactic acid as the only major product of fermentation have been placed in the genus *Lactobacillus* Beijerinck (32, 34).

The anaerobic to aerotolerant species formerly classified in the genus *Corynebacterium* Lehmann and Neumann have been transferred to the genus *Propionibacterium* Orla-Jensen on the basis of their similarity in metabolic activity, particularly the production of propionic acid (29, 32). Johnson and Cummins (22) showed that these two groups of organisms have similar cell wall compositions and similar guanine plus cytosine contents in their deoxyribonucleic acids, further substantiating this reclassification.

It has been brought to our attention that when the new names and combinations that resulted from the abovementioned transfers were made, they were not clearly identified as such. Furthermore, the publications involved were written by multiple authors, and it also was not clear who was responsible for the new names and combinations in each case. The purpose of this note is to list the new combinations and the new names and to identify the authors of each. Also, according to Rule 21, Note 1 of the Bacteriological Code (21), "the proposal of a subspecific name which excludes the type of the species automatically creates another subspecific name which includes the type. The author of the species name is to be cited as the author of such automatically recognized subspecific name." Such names created automatically by our proposals of new subspecific names which excluded the types of the species are also listed here together with their proper author citations. In addition, five new combinations and a new name are proposed in this paper as the result of the transfer of six species to other genera.

In the list which follows, basionyms, i.e., epithet-bringing names, are given in brackets. Synonyms, other than those which are basi-
B. melaninogenicus subsp. melaninogenicus
( Oliver and Wherry 1921 ) Roy and Kelly 1939.
[Bacterium melaninogenicum Oliver and
Wherry 1921].
B. melaninogenicus subsp. intermedius
B. melaninogenicus subsp. acascharolyticus
B. niger (Sebald 1962) Holdeman and Moore,
1970, 33. [Sphaerophorus abercedens subsp.
niger Sebald 1962].
Fusobacterium gondiaformans (Tunicliff and
[Bacillus gondiaformans Tunicliff and
Jackson, 1925].
F. naviforme (Jungano 1909) Moore and
Holdeman 1970, 45. [Bacillus naviformis
Jungano 1909].
F. varium (Eggerth and Gagnon 1933) Moore
and Holdeman 1969, 12. [Bacteroides varius
Eggerth and Gagnon 1933].
F. glutinosum (Hauduroy et al. 1937) Moore
and Holdeman 1970, 45. [Bacteroides glu-
tinosus Hauduroy et al. 1937].
F. necrophorum (Flügge 1886) Moore and
Holdeman 1969, 12. [Bacillus necrophorus
Flügge 1886] (Sphaerophorus necrophorus
(Flügge 1886) Prévot 1938).
F. mortiferum (Harris 1901) Moore and
Holdeman 1970, 45. [Bacillus mortiferus Harris
1901].
F. symbiosum (Stevens 1956) Moore and
Holdeman 1972, 21. [Bacteroides symbiosus
Stevens 1956]. (W. C. Stevens, Ph.D. thesis,
Vanderbilt Univ., Nashville, 1956.)
F. necrogenes (Weinberg et al. 1937) Moore
and Holdeman 1970, 45. [Bacillus necrogenes
Weinberg et al. 1937].
F. prausnizii (Hauduroy et al.) Moore and
Holdeman 1970, 45. [Bacteroides prausnizii
(sic) Hauduroy et al. 1937].
F. bullosus (Distaso 1912) Moore and
Holdeman 1970, 45. [Bacillus bullosus Distaso
1912].
F. russii (Hauduroy et al. 1937) Moore and
Holdeman 1970, 45. [Bacteroides russii
Hauduroy et al. 1937].
Propionibacterium avidum (Eggerth 1935)
Moore and Holdeman 1969, 7. [Bacteroides
avidus Eggerth 1935].
P. granulosum (Prévot 1938) Moore and
Holdeman 1970, 15. [Corynebacterium granu-
losum Prévot 1938].
Eubacterium alactolyticum (Prévot and Taf-
[Ramibacterium alactolyticum Prévot and
Taffanel 1942].
E. saburreum (Prévot 1966) Holdeman and
Moore 1970, 23. [Catenabacterium saburreum
Prévot 1966].
E. budayi (Le Blaye and Guggenheim 1914)
Holdeman and Moore 1970, 23. [Bacterium
budayi Le Blaye and Guggenheim 1914].
E. multiforme (Distaso 1911) Holdeman and
Moore 1970, 23. [Bacillus multiformis Distaso
1911].
E. cylindroides (Rocchi 1908) Holdeman and
Moore 1970, 23. [Bacterium cylindroides
Rocchi 1908].
E. moniliforme (Repaci 1910) Holdeman and
Moore 1970, 23. [Bacillus moniliformis Repaci
1910; not Bacillus moniliformis Garnier 1907.
(The former name is illegitimate as a later
homonym of the latter, and Bacillus repazii
Herter 1917 appears to be the first legitimate
name proposed for Repaci's organism. Thus the
correct specific epithet in the name of this
organism is "repazii." However, "moniliforme"
has come into common usage for this organism,
and, in the interest of stability in nomenclature,
this matter should be referred to the Judicial
Commission of the International Committee on
Systematic Bacteriology.)
E. cellulosolvens (Bryant et al. 1958) Holden-
am and Moore 1972, 39. [Cillobacterium
cellulosolvens Bryant et al. 1958].
E. combesii (Prévot and Laplanche 1947)
Holdeman and Moore 1970, 23. [Cillobac-
terium combesii Prévot and Laplanche 1947].
E. tenue (Bergey et al. 1923) Holdeman and
Moore 1970, 23. [Bacteroides tenuis Bergey
et al. 1923].
Lactobacillus cateniforme (Eggerth 1935)
Moore and Holdeman 1970, 15. [Bacteroides
cateniformis Eggerth 1935].
L. crispatus (Brygoo and Aladame 1953)
Moore and Holdeman 1970, 15. [Eubacterium
crispatum Brygoo and Aladame 1953].
L. minutus (Hauduroy et al. 1937) Moore and
Holdeman 1972, 63. [Bacteroides minutus
Hauduroy et al. 1937].

Because of its metabolic and morphological
characteristics, Zuberella nova Prévot 1947 was
transferred to Fusobacterium as Fusobacterium
novum (Prévot) Moore and Holdeman 1970
(11). However, during the preparation of
manuscripts for the eighth edition of Bergey's
Manual of Determinative Bacteriology (in press)
and the comparison of the descriptions and
data gathered on available strains, we noted
that Zuberella nova cannot be differentiated
from Zuberella aquaticus Prévot 1938. The latter
organism was originally isolated and described
by Spray and Laux (50) and later named by
Prévot (38), although there is no record of
Prévot ever having directly examined strains of
Z. aquatilis. Thus we regard these names as subjective synonyms, and the name Zuberella aquatilis has priority. Therefore the correct name of the organism previously referred to as Fusobacterium novum is Fusobacterium aquatile (Prévot) comb. nov.

No strains of Capsularis stabilis Patocka and Prévot 1947 are extant. However, this organism is sufficiently described to permit recognition if isolated again. Because it has characteristics which are possessed by members of the genus Fusobacterium as currently described (33), we propose that it be designated Fusobacterium stabile (Patocka and Prévot) comb. nov.

Cillobacterium endocarditis (sic) Prévot 1938 (see also 45) has characteristics consistent with those of members of the genus Eubacterium as currently described (18), and this organism is therefore here designated Eubacterium endocarditis (Prévot) comb. nov.

Catenabacterium helminthoides (Lewkowicz) Prévot 1938 (see also 45) has characteristics consistent with those of members of the genus Eubacterium, and thus this organism is therefore here designated Eubacterium helminthoides (Lewkowicz) comb. nov.

The organism named Catenabacterium ruminantium Stellmach-Helwig 1961 also has the characteristics of members of the genus Eubacterium. However, on transfer to Eubacterium a different specific epithet must be used because "ruminantium" is already occupied in this genus the name Eubacterium ruminantium Bryant 1959, which is the name of an organism different from that described by Stellmach-Helwig. We therefore propose the new name Eubacterium helwigiae for Stellmach-Helwig's organism (hel.Wig" i.e. M.L. gen.noun helwigiae of Helwig; named for R. Stellmach-Helwig, the first to describe this organism).

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LITERATURE CITED


