Opposition to the Proposal to Replace the Family Name *Enterobacteriaceae*[†]

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The Subcommittee on the Taxonomy of *Enterobacteriaceae* unanimously recommends that the proposal to replace the family name *Enterobacteriaceae* with *Escherichiaceae* be rejected by the Judicial Commission. The arguments in support of this recommendation are as follows: (i) *Enterobacteriaceae* is a legitimate name that has been specifically conserved as an exception to Rule 9 of the *International Code of Nomenclature of Bacteria*; (ii) the continued use of this name satisfies Principle 1 of the *Bacteriological Code* (to "aim at stability of names; avoid or reject the use of names which may cause error or confusion; and avoid the useless creation of names"); and (iii) *Enterobacteriaceae* is also specifically in accord with General Consideration 6, Principles 1, 8, and 9, Rules 21b, 23a, and 56b, and Opinion 15 of the *Bacteriological Code*, whereas the proposal to use *Escherichiaceae* violates each of these portions of the *Bacteriological Code*.

Goodfellow and Trüper proposed the name *Escherichiaceae* to replace the family name *Enterobacteriaceae* (7). These authors argued that "*Enterobacteriaceae* is not formed in accord with the rules of bacteriological nomenclature," that "*Enterobacteriaceae* is the only exception to the rule stating how family names should be formed," and that this exception is maintained for "merely historical reasons." In this report, the Subcommittee on the Taxonomy of *Enterobacteriaceae* (*Enterobacteriaceae* Subcommittee) goes on record against the proposal of what is, in our opinion, the illegitimate name *Escherichiaceae* and recommends the continued use of the legitimate and conserved name *Enterobacteriaceae*.

In June 1979, a similar proposal—to change the family name *Enterobacteriaceae* to "*Enterobacteraceae*"—was made by Lapage (10). The Judicial Commission denied this request (14). Detailed opposition to the Lapage proposal was published (5, 6), and much of the rebuttal to the Lapage proposal applies equally well to the proposal of Goodfellow and Trüper to change the family name. The most pertinent points are summarized below, but readers are invited to refer to a paper by Farmer et al. for a full discussion of the objections to changing the name *Enterobacteriaceae* (5).

A brief historical look at the name *Enterobacteriaceae* should be helpful. The family name *Enterobacteriaceae* was proposed by Rahn in 1937 (13). This family had one genus, *Enterobacter*, which included species that had previously been in the genera "*Aerobacter*," "*Eberthella*," *Erwinia*, *Escherichia*, *Klebsiella*, *Proteus*, *Salmonella*, *Serratia*, and *Shigella*, as well as strains of *Achromobacter*, *Flavobacterium*, and *Pseudomonas*. A description was not given for the family or for the genus, and a type strain was not designated (4, 13). When the first *International Bacteriological Code of Nomenclature* was adopted in 1948 (1), both *Enterobacteriaceae* Rahn 1937 and *Enterobacter* Rahn became illegitimate because they were not in accord with all of the rules, which were retroactive.

In 1957, a formal proposal was made to the Judicial Commission to conserve the family name *Enterobacteriaceae* and to make *Escherichia* its type genus and *Escherichia coli* its type species (2). This proposal was approved in Opinion 15 of the Judicial Commission, issued in 1958, and the family name formally became *Enterobacteriaceae* Rahn 1937 nom. fam. cons. (Opin. 15, Jud. Comm. 1958) (3, 9). The name *Enterobacteriaceae* became universally accepted and was not questioned again until 1973, when the Judicial Commission noted that although this name had not been formed according to Rule 3 of the 1958 *International Code of Nomenclature of Bacteria and Viruses*, it had been conserved (12). The Judicial Commission asked the *Enterobacteriaceae* subcommittee for

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a recommendation on this question. In 1975, The *Enterobacteriaceae* Subcommittee voted 12 to 2 to retain the name *Enterobacteriaceae*. It is important to note that the *Enterobacteriaceae* Subcommittee members were specifically asked to choose one of three names; 12 members voted to keep *Enterobacteriaceae*, 2 members voted to change the family name to "*Enterobacteraceae*," and none voted to change the name to *Escherichiaceae*. A revised version of the *International Code of Nomenclature of Bacteria* appeared in 1975 (11), in which Opinion 15, conserving *Enterobacteriaceae*, was reaffirmed.

In the minutes of their 1978 meeting (published in 1979), the members of the Judicial Commission voted to reverse Opinion 15. The Commission "proposed to conserve the family name '*Enterobacteraceae*' with the type genus *Enterobacter* on the grounds that this would cause less disturbance than the change to the family name *Escherichiaceae* with the type genus *Escherichia*" (8). The proposal to change the family name to "*Enterobacteraceae*" was formally made by Lapage (10). The *Enterobacteriaceae* Subcommittee voted 11 to 0 against this proposal, and the American Society for Microbiology Subcommittee on Gram-Negative Facultatively Anaerobic Fermentative Rods (ASM Subcommittee) voted 7 to 0 against it. Arguments against the proposal were published in 1980 (5, 6). In 1981 the proposal of Lapage to change the family name to "*Enterobacteraceae*" was rejected by the Judicial Commission (14).

Since the proposal of Goodfellow and Trüper to change the family name to *Escherichiaceae* was published in 1982, both the *Enterobacteriaceae* Subcommittee and the ASM Subcommittee have unanimously voted (9 to 0 and 8 to 0, respectively) against it. These votes are not surprising since the Judicial Commission stated (see above) that *Escherichiaceae* would cause more disturbance than "*Enterobacteraceae*" (8), and both the *Enterobacteriaceae* Subcommittee and the ASM Subcommittee have taken a similar view in votes and in discussions.

The people who work closely with *Enterobacteriaceae* have consistently voted either unanimously or overwhelmingly to keep the name. The objections of the *Enterobacteriaceae* Subcommittee to the proposal of *Escherichiaceae* are given below.

Goodfellow and Trüper stated that *Enterobacteriaceae* is not formed according to the rules of bacteriological nomenclature and that the name is retained for "merely historical reasons" (7). When *Enterobacteriaceae* was formed, there was no *Bacteriological Code*. The name became conserved, legitimate, and in accordance with the rules of nomenclature in 1958 when Opinion

15 was adopted. Once adopted, Opinions are part of the rules of nomenclature; thus, *Enterobacteriaceae* is a legitimate name, not an illegitimate name as is often stated by those who wish to change it. *Enterobacteriaceae* is maintained because it conforms to the rules of nomenclature as specifically covered by Opinion 15 and because it is probably the most widely known and accepted family name in bacteriology. The validity of Opinion 15 and the validity of the name *Enterobacteriaceae* have repeatedly been reaffirmed in Judicial Commission actions and in the *Bacteriological Code* for 25 years. In actual practice, *Escherichiaceae* has been used in the literature once (7), whereas since its introduction *Enterobacteriaceae* has been used, by conservative estimates, more than 100,000 times (5). A name change would cause a tremendous amount of confusion for all nonexperts. It would be particularly difficult for computer programmers and those who use computer abstract searches. Every program currently in use would have to be altered to cross-reference *Enterobacteriaceae* and *Escherichiaceae*, a time-consuming and expensive task.

Those who oppose the name *Enterobacteriaceae* have never argued that it is confusing or misunderstood. Their arguments have been solely on the basis that *Enterobacteriaceae* was not formed in accordance with Rule 9 of the 1975 *Bacteriological Code* (7, 8, 10). Rule 9 states: "Names of taxonomic groups (taxa) between suborder and genus are formed by the addition of the appropriate suffix to the stem of the name of the type genus" (11). *Enterobacteriaceae* has an extra i and does not represent the type genus, which is *Escherichia*. Although *Enterobacteriaceae* does not satisfy Rule 9, it is totally in accordance with the rules of nomenclature because it was specifically excepted from Rule 9 by having been conserved in Opinion 15 (11) under the *Bacteriological Code*. This and other exceptions to the rules of nomenclature have been allowed, in accordance with many of the principles and rules of nomenclature.

General Consideration 6 of the *Code* allows "for emendations of rules" and "for special exceptions to the rules" (11). The conservation of *Enterobacteriaceae* under Rule 21b (12) in Opinion 15 is such an exception. Rule 21b states: "If the name of a family was not made in conformity with Rule 21a but its name has been conserved, then the type genus may be fixed by an Opinion of the Judicial Commission." The following example is given: "The genus *Escherichia* is the type genus of the family *Enterobacteriaceae* (Opinion 15)." Thus, Rule 21b and Opinion 15 specifically make *Enterobacteriaceae* a legitimate name under the *Bacteriological Code*.

Principle 1 (11) states: "The essential points in nomenclature are . . . (1) aim at stability of names, (2) avoid or reject the use of names which may cause error or confusion, (3) avoid the useless creation of names." Retention of the name *Enterobacteriaceae* satisfies all three of these points. The use of *Escherichiaceae* would cause a great deal of confusion. It is a useless name, in that its only purpose is to eliminate a legitimate exception to Rule 9.

Principle 8 and Rule 28a (11) state: "Each order or taxon of a lower rank with a given circumscription, position, and rank can bear only one correct name, i.e., the earliest that is in accordance with the Rules of the *Bacteriological Code*." *Enterobacteriaceae* is the only correct name for the family, and it is in accordance with the rules of the *Code*. *Escherichiaceae* is currently, in our opinion, an illegitimate name.

Principle 9 (11) states: "The name of a taxon should not be changed without sufficient reason based either on future taxonomic study or on the necessity of giving up a nomenclature that is contrary to the rules of this *Code*." The proposed change to *Escherichiaceae* is not based on taxonomic study, and *Enterobacteriaceae* is in accord with the *Bacteriological Code* as specifically addressed in Rule 21b and Opinion 15.

Rule 56b (11) states: "A conserved name (*nomen conservandum*) is a name which must be used instead of all earlier synonyms and homonyms. A conserved name (*nomen conservandum*) is conserved against all other names for the taxon, whether these are cited in the corresponding list of rejected names or not, so long as the taxon concerned is not united with another taxon bearing a legitimate name." This rule clearly indicates that the conserved name *Enterobacteriaceae* should continue to be used since this taxon has not been combined with any other taxon.

The only reason which Goodfellow and Trüper give in support of the proposed change is that *Enterobacteriaceae* does not conform to Rule 9 of the *Bacteriological Code*. However, it does not have to conform to Rule 9, because it is specifically excepted from Rule 9 by Opinion 15 and Rule 21b. There is no doubt concerning the legitimacy of *Enterobacteriaceae* under the current *Bacteriological Code*. The rejection of *Enterobacteriaceae* and the adoption of *Escherichiaceae* would violate the following parts of the *Bacteriological Code* (see above): General Consideration 6, Principles 1, 8, and 9, Rules 21b, 23a, and 56b, and Opinion 15. Therefore, the proposed name *Escherichiaceae* is untenable from the standpoint of the rules of nomenclature.

Principle 1 of the *Bacteriological Code* is concerned with the stability of names and the

avoidance of confusion in nomenclature. The proposal of *Escherichiaceae* is in conflict with Principle 1 because from a practical standpoint, the proposed name change would cause confusion and consternation. The validity of *Enterobacteriaceae* has repeatedly been reaffirmed by the Judicial Commission and in the *Bacteriological Code*. The *Enterobacteriaceae* Subcommittee has consistently opposed attempts to change the name *Enterobacteriaceae* and has voted unanimously against the *Escherichiaceae* proposal. *Enterobacteriaceae* has been universally accepted for more than 45 years. We doubt that another name would be accepted by the scientific community and used in the scientific literature.

For all of these reasons, the members of the Subcommittee on the Taxonomy of *Enterobacteriaceae* of the International Committee on Systematic Bacteriology unanimously recommend that the Judicial Commission reject the proposal of Goodfellow and Trüper to replace the *Enterobacteriaceae* with *Escherichiaceae*.

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