SALMONELLA TYPHOSA VERSUS SALMONELLA TYPHI

A Request for an Opinion

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In studying the early literature in preparation for the next edition of Bergey's Manual, a solution has been found for a problem in bacteriological nomenclature that has puzzled many of us. When the Salmonella Subcommittee of the International Committee on Bacteriological Nomenclature (1), published their first report, they used Salmonella typhi (Schroeter) Warren and Scott as the name of the typhoid fever organism. The same specific epithet was also used in the first three editions of Bergey's Manual in the binomial Eberthella typhi (Schroeter) Buchanan.

C.D. Kelly, in reviewing early literature in preparation for the 4th edition of the Manual, discovered that Zopf (2) had given the name Bacillus typhosus to Eberth's typhoid bacterium before Schroeter (3) named it Bacillus typhi. For this reason the specific epithet "typhosa" has been used in the fourth, fifth, and sixth editions of the Manual. Zopf's 1885 name was validly published prior to the publication of Bacillus typhi Schroeter, 1886 and Bacillus typhi abdominalis Flugge, 1886 (4). However, some have not used the specific epithet "typhosus" because Klebs (5) had given the name Bacillus typhosus in 1880 to an organism that he isolated and described as the cause of typhoid fever. Subsequently it was shown that the organism described by Klebs was not the typhoid fever organism and that it was different from the true typhoid bacterium described first by Eberth (6) and later by Gaffky (7).

With the placing of the typhoid bacterium in the genus Salmonella in the 6th edition of Bergey's Manual with the specific epithet "typhosa" while the Enterobacteriaceae Subcommittee that has replaced the Salmonella Subcommittee continues to use Salmonella typhi, there has been a general request that the problem of the priority of these names be investigated so that there would be harmony in the nomenclature used in bacteriological literature.

In preparation for the next edition of Bergey's Manual, another review was made of the early literature describing

the typhoid organism whereupon it was discovered that the first name given by Zopf to Eberth's typhoid organism was Bacterium typhosum. This was validly published in the Anhang to the second edition of his Die Spaltpilze published in 1884, p. 90 (8). It had been overlooked because this binomial does not appear in the index. As both the organism and the binomial are different from the organism and the binomial as recorded by Klebs, there can be no question but that Zopf's Bacterium typhosum has priority over Schroeter's Bacillus typhi. It is proper to use not only Bacterium typhosum Zopf as the name for the typhoid bacterium, but also Salmonella typhosa (Zopf) White, Eberthella typhosa (Zopf) Weldin or any other suitable binomial except Bacillus typhosus Zopf. The latter binomial is an illegitimate homonym of Bacillus typhosus Klebs. Klebs' organism has never been placed in any genus but Bacillus and probably never will be as it was soon realized that it was not the true typhoid organism.

A number of papers have been reviewed in the search to determine who first used the binomial Salmonella typhosa. Thus far, no author has been found who used it earlier than White (9) in 1930. Apparently when it is desired to give a record of the origin of the binomial Salmonella typhosa it should be written Salmonella typhosa (Zopf, 1884) White, 1930.

When a preliminary draft of this manuscript was presented to Dr. R. E. Buchanan, Chairman of the Judicial Commission on Bacteriological Nomenclature, he raised the question whether Flügge did not publish his name, Bacillus typhi abdominalis, for the species earlier than 1886. Therefore a search was made for a copy of the first edition of Flügge's book (10) which was found to form a part of a larger Handbuch by v. Pettenkofer and v. Ziemssen. In the text, Flügge writes, p. 133: "Beim Typhus abdominalis fand Eberth (Lit. 280) unter 23 untersuchten Fällen 12 mal, später unter 17 Fällen 6 mal, in Lymphdrüsen und Milz kurze Stäbchen, an den Enden leicht abgerundet, verschmälerten Ovoiden gleichend; zuweilen waren Sporen in den Bacillen sichtbar." In no place in the text does he use anything other than a casual name for the Eberth organism; and the same statement holds true for all of the papers written on this topic by Eberth and by Gaffky.

However, Flügge copies Eberth's figure of his organism on the same page with the caption "Bacillus typhosus (?) (Nach Eberth)". It is not clear why Flügge placed the (?)

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after this binomial, but the probability seems to be that he questioned whether Bacillus typhosus, the name that had been suggested previously for the typhoid organism by Klebs, was the correct name to use for Eberth's organism, the organism shown in his figure. Certain it is that when Flügge published the second edition of his book under the title *Die Mikroorganismen*, he did not use Bacillus typhosus for Eberth's organism, but proposed the new name Bacillus typhi abdominalis for it. It should be noted that while Flügge's name is composed of three words it is in reality a binomial as defined in the Botanical and Bacteriological Codes of Nomenclature. If used as a binomial it should be either hyphenated or, preferably, written as Bacillus typhiabdominalis.

The use by Flügge in 1883 of Klebs' name as a questionable name for the Eberth organism apparently does not in any way affect the legitimate status of the validly published Bacterium typhosum Zopf, 1884.

It is hoped that now that the story of the name for this typhoid organism is known, not only the Enterobacteriaceae Subcommittee, but also all others who have occasion to use a binomial for the typhoid organism will use it in the correct form.

Request for an Opinion

The Judicial Commission is requested to issue an Opinion determining the acceptability of Bacterium typhosum Zopf 1884 as the first legitimate name given to the causal organism of typhoid fever (typhus abdominalis), and the consequent legitimacy of the specific epithet in Salmonella typhosa (Zopf 1884) and White 1930.

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