Recommendations on Recent Proposals for the Classification of Shigellae

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A number of recent proposals to change the classification of shigellae were studied by the International Committee on Systematic Bacteriology Subcommittee on the Taxonomy of *Enterobacteriaceae*, which recommended adoption of the following proposals: (i) subdivision of *Shigella flexneri* serotype 5 into two subserotypes, 5a and 5b; (ii) reduction of the number of *S. flexneri* serotype 3 subserotypes from three to two; (iii) that *Shigella* sp. provisional serotype 2000-53 is not a *Shigella*, but an *Escherichia coli*; (iv) that provisional *Shigella* sp. serotypes 3873-50 and 3341-55 be added to the *Shigella* serotyping scheme as *Shigella dysenteriae* serotypes 11 and 12; (v) that provisional *Shigella* sp. serotypes 2710-54 and 3615-53 be added to the *Shigella* serotyping scheme as *Shigella boydii* serotypes 16 and 17; (vi) that *Shigella* sp. strain E 10163 and similar strains be added to the *Shigella* serotyping scheme as *S. boydii* serotype 18; and (vii) that provisional *Shigella* sp. serotype 1621-54 retain its provisional status pending study of additional strains.

In 1979, Petrovskaya and Khomenko made eight proposals that dealt with the classification of *Shigella* serotypes (6). In 1980, Gross et al. proposed a new serotype in *Shigella boydii* (2). The International Committee on Systematic Bacteriology Subcommittee on the Taxonomy of *Enterobacteriaceae* (the Subcommittee) studied these nine proposals. The recommendations of the Subcommittee are given below.

The first proposal of Petrovskaya and Khomenko was to subdivide *Shigella flexneri* serotype 5 into two subserotypes, 5a and 5b. Subserotype 5a would have the antigenic formula V:3,4, and subserotype 5b would have the antigenic formula V:7,8. This proposal is supported by data published by Simmons (3, 4, 7) and by Petrovskaya and Bondarenko (5) and was confirmed by M. Toucas, National *Shigella* Centre of France (personal communication). The Subcommittee recommends adoption of this proposal.

The second proposal of Petrovskaya and Khomenko was to reduce the present designation of three subserotypes of *S. flexneri* 3 to two subserotypes that differ in the presence of III:7,8. In the present system subserotype 3a is III:6,7,8, subserotype 3b is III:3,4,6, and subserotype 3c is III:6. These formulas would become (3,4),6,7,8 for subserotype 3a and (3,4),6 for subserotype 3b. The third proposal of Petrovskaya and Khomenko was to reverse the presently used designations for subserotypes 3a and 3b. In the proposed system, subserotype 3a would be III:(3,4),6 and subserotype 3b would be III:(3,4),6,7,8. The 3,4 reaction is weak or unstable or both and is often difficult to interpret. The Subcommittee recommends adoption of the proposal to recognize only two subserotypes in *S. flexneri* 3 by combining subserotypes 3b and 3c, but does not agree with reversing the designations for subserotypes 3a and 3b. The reason for the proposal to reverse the subserotype 3a and 3b designations was to have the subserotypes conform with the subserotype designations in *S. flexneri* serotypes 1,2,4, and 5, where the a subserotypes have factors 1,3,4 and the b serotypes have factors 7,8. Although it is logical, the Subcommittee recommends rejection of this proposal because reversing the subserotype designations would have no practical value. In fact, this proposal would cause a great deal of

confusion by changing the designations that have been used and universally accepted for almost 35 years (1).

The fourth proposal of Petrovskaya and Khomenko was to transfer *S. flexneri* serotype 6 to *Shigella boydii*. They cited serological, biochemical, and genetic data to support this proposal. This question was discussed by the Subcommittee Working Group on *Shigella* at the 1973 International Congress of Bacteriology. The Working Group concluded that "although there is serological, chemical, and genetic evidence in favor of excluding *S. flexneri* 6 from *S. flexneri*, the historical reasons make exclusion untenable" (8). Therefore, this change would have no practical value and would cause confusion by altering a well-accepted system. The Subcommittee reaffirms its 1973 opinion and recommends that this proposal be rejected.

The fifth proposal of Petrovskaya and Khomenko was to transfer provisional *Shigella* sp. serotype 2000-53 to *Escherichia coli*. These authors presented data showing that this serotype had the *E. coli* O:6 antigen and that it was resistant to a *Shigella*-specific bacteriophage. Unpublished data from the World Health Organization International Collaborating *Shigella* Center (H. G. Wathen-Grady, personal communication) on serotyping and biochemical reactions of two serotype 2000-53 strains led to the conclusion that they were *E. coli* rather than *Shigella*. The Subcommittee recommends adoption of this proposal.

The sixth proposal of Petrovskaya and Khomenko was that provisional serotypes 3873-50 and 3341-55, on the basis of their cultural and biochemical properties, be added to the *Shigella* serotyping scheme as *Shigella dysenteriae* serotypes 11 and 12, respectively. Wathen-Grady (unpublished data) has shown that these serotypes are unique and that they are biochemically most similar to *S. dysenteriae*. The Subcommittee recommends adoption of this proposal.

The seventh proposal of Petrovskaya and Khomenko was that provisional *Shigella* sp. serotypes 2710-54 and 3615-53, on the basis of their cultural and biochemical properties, be added to the *Shigella* serotyping scheme as *S. boydii* serotypes 16 and 17. Wathen-Grady (unpublished data) has also shown that these serotypes resemble *S. boydii* biochemically and that they are serologically distinct from other *S. boydii* serotypes. Gross et al. proposed that 11 strains isolated from feces of patients with diarrhea be regarded as a provisional serotype of *S. boydii*. The reference strain of this group is

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strain E 10163. Strain E 10163 had a serological cross-reaction with provisional *Shigella* sp. serotype 3341-55, but this cross-reaction was removed by adsorption. Biochemically, the strain E 10163 group was mannitol positive, a reaction typical of *S. boydii* strains, whereas serotype 3341-55 was mannitol negative (2). These observations were confirmed by Wathen-Grady (unpublished data). The Subcommittee recommends that provisional serotype 2710-54 be added to the *Shigella* serotyping scheme as *S. boydii* serotype 16, that provisional serotype 3615-53 be added as *S. boydii* serotype 17, and that provisional serotype E 10163 be added as *S. boydii* serotype 18.

The eighth proposal of Petrovskaya and Khomenko was to retain the provisional status of provisional *Shigella* sp. serotype 1621-54. This provisional serotype has a serological cross-reaction with *S. boydii* 12, but it is raffinose positive, an atypical reaction for *S. boydii*. The Subcommittee recommends that, pending further study, serotype 1621-54 remain as a provisional *Shigella* serotype.

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