RECOMMENDED DESIGNATIONS FOR THE
SUBSEROTYPES OF SHIGELLA FLEXNERI

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SUMMARY. Recommendations are made regarding the designations applied to the serotypes of Shigella flexneri, and certain changes are recommended in those applied to subserotypes of S. flexneri 3.

The use of abbreviated antigenic formulas, in addition to alphabetic designations, is recommended when reporting subserotypes of S. flexneri.

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The purpose of this communication is to make recommendations regarding the manner in which subserotypes of Shigella flexneri should be designated and reported. Special reference is made to the subserotypes of S. flexneri 3.

Boyd (1940) substituted the Roman numerals I, II, and III for the alphabetic designations V, W, and Z employed by Andrewes and Inman (1919) and others and extended the number of recognized serotypes to include IV(103), V(119), and VI(88, Newcastle, and Manchester). Andrewes and Inman, Boyd and others also recognized subserotypes within certain of the serotypes but did not propose particular designations for them.

Wheeler (1944) also used Roman numerals to designate the six principal serotypes of S. flexneri and introduced the use of lower-case Roman letters to designate two subserotypes within S. flexneri II, i.e., IIa and IIb. Similar designations later were employed by Wheeler (personal communications 1944, 1946) to subserotypes of S. flexneri I (Ia and Ib) and S. flexneri IV (IVa and IVb). The serotype and subserotype designations employed by Boyd and by Wheeler were adopted by Ewing (1944), Kauffmann and Ferguson

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(1948), and by Ewing (1949). These designations also were used in recommendations made by the Shigella Commission of the Enterobacteriaceae Subcommittee of the International Committee on Bacteriological Nomenclature regarding S. flexneri (vide 1950 and 1953 Reports of the Enterobacteriaceae Subcommittee, published 1954) except that the Shigella Commission recommended the use of Arabic numerals rather than Roman ones to designate the various serotypes of Shigella, including S. flexneri serotypes. This usage was applied only to serotype designations (e. g., S. flexneri 2a) for use in reporting cultures and did not apply to the designations given to the individual type-specific antigens of Shigella strains, for which the use of Roman numerals was retained. The group-antigen factors and complexes continue to be designated by Arabic numerals.

The accepted serotypes and subserotypes of S. flexneri are listed in Table 1 together with the reactions that may be expected with properly absorbed antisera. Also abbreviated antigenic formulae based upon antigenic structure are given in the table. The uses of abbreviated formulae in reporting results of typing was recommended by one of the authors in 1949 because they provide a further characterization of strains and provide a means of demonstrating to bacteriologists, epidemiologists, and others how cultures from various sources may differ.

In the 1958 Report of the Enterobacteriaceae Subcommittee, three subserotypes of S. flexneri 3 were added to the Shigella schema: S. flexneri 3a, 3b, and 3c. Experience has shown that these are valid, antigenically distinct subserotypes that are of importance not only epidemiologically but taxonomically as well. However, changes in the application of the designations 3a and 3b are necessary for purposes of clarity. Attention is directed to the fact that in a supplement to the 1958 Report of the Enterobacteriaceae Subcommittee, S. flexneri 3b was characterized as having group complex 3, 4 in addition to the 6 factor and the 7, 8 complex, while in Table 1 of this paper, subserotype 3b is listed as one that possesses group complex 3, 4 and factor 6 but lacks the 7, 8 complex. It is recommended that strains having the formula III:3,4;6... should be designated S. flexneri 3b, as in Table 1, since the presence of the 3, 4 complex and the absence of the 7, 8 complex are constant in this particular subserotype designated 3b in the supplement to the 1958 Report. Cultures of S. flexneri 3 that possess group complex 3, 4 in addition to factor 6 and the 7, 8 com-

TABLE 1

Shigella flexneri serotypes and subserotypes

Serotype	Subsero- type	Abbreviated antigenic formula	Absorbed antisera								Subserotype complexes or factors		
			I	Type II	specific III	IV	V	VI			3,4	6	7,8
1	1a	I:4...	++*	-	-	-	-	-			++	-	-
	1b	I:6...	++	-	-	-	-	-			-	++	-
2	2a	II:3,4...	-	++	-	-	-	-			++	-	
	2b	II:7,8...	-	++	-	-	-	-			-	-	++
3	3a	III:6:7,8...	-	-	++	-	-	-			-	++	++
	3b	III:3,4:6...	-	-	++	-	-	-			+	++	-
	3c	III:6...	-	-	++	-	-	-			-	++	-
4	4a	IV:3,4...	-	-	-	++	-	-			++	-	-
	4b	IV:6...	-	-	-	++	-	-			-	++	-
5	5	V:7,8...	-	-	-	-	++	-			-	-	++
6	6	VI:-...	-	-	-	-	-	++			-	-	-
X variant		-:7,8...	-	-	-	-	-	-			-	-	++
Y variant		-:3,4...	-	-	-	-	-	-			++	-	-

* Indicates degree of reaction: ++ rapid and complete, + weaker reaction, - no reaction (slide agglutination tests).

plex should be regarded as varieties of S. flexneri 3a and may be reported as S. flexneri 3a (III:3,4:6:7,8). The commonly occurring variety of S. flexneri 3a (i.e., the classical Z) may be characterized by the abbreviated antigenic formula given for 3a in Table 1. The earlier (1958) recommendation regarding subserotype 3c remains unchanged. These may be reported S. flexneri 3c (III:6...).

While only the well known and accepted serotypes and subserotypes of S. flexneri are listed in Table 1, it is known that varieties of several subserotypes occur that differ slightly from the usual either by possession of an additional group-antigenic factor or by the lack of one. Since characterization of such varieties may be of value and importance, particularly to epidemiology, it is recommended that these should be characterized by means of abbreviated antigenic formulae rather than by means of additional subserotypic designations such as 1c, 4c, 4d, 4e, as suggested by some writers. However, the factors or characters that make these subserotypic varieties different usually are variable or transitory, hence separate subserotype status should not be assigned to them. For example, a variety of subserotype 3a that possesses the 3,4 complex was mentioned in the preceding paragraph. Others include varieties of S. flexneri 1a and 4a that contain small amounts of the 7,8 complex, which may be reported as S. flexneri 1a (I:4:7,8...) and 4a (IV:3,4:7,8...), respectively. Also, some strains of S. flexneri 4b possess the 3,4 complex, as do some S. flexneri 6 cultures. These may be reported S. flexneri 4b (IV:3,4:6...) and S. flexneri 6 (VI:4...), respectively. Additionally, cultures that belong to serotypes 1,2 and 4 may be seen which, when they are freshly isolated, fail to react in slide tests in absorbed antiserum for the 3,4 complex. Generally, these may be shown to be S. flexneri 1a, 2a, or 4a by other methods. Similarly, S. flexneri 5 strains are seen that fail to react in absorbed 7,8 complex antiserum in slide-agglutination tests. However, the presence of this complex usually can be ascertained by examination of single colonies from platings.

Variant cultures in which type-specific antigen cannot be demonstrated may be reported as S. flexneri X variant (-:7,8...) or as S. flexneri Y variant (-:3,4...). If subserotyping is not done, cultures may be reported simply as S. flexneri 1, S. flexneri 2, etc.

It must be emphasized that the antigenic formulas given in this paper are abbreviated ones, which employ the im-

portant diagnostic antigens only, and are not intended to show the complete antigenic structure of S. flexneri subserotypes.

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