RAPID SEROLOGICAL TYPING OF SHIGELLAE: A PRELIMINARY NOTE

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In the course of our studies on the antigenic analysis of shigellae, methods have been evolved whereby it is possible to identify rapidly the more common *Shigella* types. The methods are based upon the antigenic structure of the organisms as outlined by Boyd (1938) and upon our own findings.

When a strain is isolated or received for identification it is first tested by spot agglutination in two polyvalent sera at 1:10 dilution. The first serum contains agglutinins for *Shigella paradysenteriae* type Flexner I ("V"), Flexner II ("W"), and Flexner III ("Z"). The second has agglutinins against Flexner IV (Boyd 103), Flexner V (Boyd P. 119), and Flexner VI (Boyd 88-Newcastle types). The organisms agglutinate quickly and completely in the polyvalent serum containing the specific agglutinins of proper type. There is some cross agglutination in these two sera owing to the common group antigens of the several components (e.g., Flexner III and Flexner V strains will often cross-agglutinate to titer, but the heterologous agglutinins may easily be removed from their sera by cross absorption, without materially reducing the titer for the homologous type).

The next step is to type the microorganism by individual tests with the various factors present in the polyvalent serum. For these tests the spot plate is also used and the specific sera listed in the accompanying table (table 1) are employed at a serum dilution of 1:5 or 1:10. Agglutination is rapid and complete and the strain can usually be tentatively identified by this means alone.

For confirmation of the results obtained by spot agglutination, a simple, one-tube agglutination test has been devised. For these tests the sera are absorbed, when necessary, and titrated with known strains of the various types. The sera are employed at a dilution which will give rapid and specific agglutination. If the culture being tested is believed to be a Flexner I, for example, it is set up in one-tube tests against absorbed Flexner I, IIa, IIb, and III antisera; if it is thought to be a Flexner V, it is tested with Flexner IV, V (absorbed with III), and VI antisera. A control consisting of one tube of saline suspension only is included with each test. The tests are then placed in a water bath at 50 to 52 C. It is usually possible to read the tests after 2 hours; however, some strains (e.g., Flexner IIb) may require 4 hours for complete agglutination. The results of such tests with various Flexner types are contained in table 1.

Several (3 to 30) strains of each type were tested with results similar to those

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listed in table 1. In each case the results were confirmed by serial dilution agglutination tests.

TABLE 1

One-tube agglutination tests with the various Flexner types of S. paradysenteriae

ANTI-SERA	ABSORBED WITH:	DILUTION	BACTERIAL SUSPENSIONS																			
			I			IIa			IIb			III			IV			V			VI		
			HOURS																			
			2	4	18	2	4	18	2	4	18	2	4	18	2	4	18	2	4	18	2	4	18
I	II, III	250	4*	4	4	0*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IIa	I, III	250	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IIb	I, IIa, III	125	0	0	0	0	0	0	2	4	4	0	0	0	0	0	0	0	0	0	0	0	0
III	I, II, V	250	0	0	0	0	0	0	0	0	0	3	4	4	0	0	0	0	0	0	0	0	0
IV	Unabsorbed	250	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0
V	III	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	0	0	0
VI	Unabsorbed	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4

* The figures indicate degree of agglutination; 4 denotes complete agglutination and sedimentation.
"0" indicates absence of agglutination at dilution employed.

The methods outlined were also applied to the Boyd types (Boyd I, 170; II, P. 288; III, D. 1; IV, P. 274; D. 19; 143), *Shigella alkalescens*, *Shigella schmitzii*, and other types, with success. For instance, *S. alkalescens* and Boyd IV (P. 274) may be easily distinguished by these methods using cross-absorbed sera.

These studies are being extended and a detailed report will be published.

REFERENCE

BOYD, J. S. K. 1938 The antigenic structure of the mannitol-fermenting group of dysentery bacilli. J. Hyg., 38, 477–499.