THE POSITION OF NEWCASTLE BACTERIA IN THE
CLASSIFICATION OF THE SHIGELLAE¹

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SUMMARY. New evidence is presented, based on immunoelectrophoretic analysis of the antigenic structure of various representatives of the genus Shigella, which supports the eligibility of recognition of the Newcastle bacteria as a distinct systematic entity, as is provided for in the Soviet classification of the shigellae.

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The taxonomic position of Newcastle dysenteric bacteria is resolved differently by the International Classification Scheme and by Soviet authors (Troitski 1953; Novgorodskaya 1959; Ravitch-Birger 1961). As is known, according to the International Scheme these bacteria are placed in Subgroup B as one of the Types, denoted as Flexner-6. The Soviet Scheme regards the bacteria as a separate subspecies (of Shigella flexneri). The promotion of Newcastle bacteria to the rank of a distinct subspecies was founded on the difference in fermentation behavior, as compared with Flexner bacilli, and on the peculiar serologic relations between them (Novgorodskaya 1959; Grinberg 1963).

One of the basic criteria in solving disputable problems of bacterial taxonomy is investigation of antigenic structure of the bacteria. The new method of immunoelectrophoretic analysis proposed recently by Grabar and Williams allows the demonstration of the antigenic composition of a microbial cell quite fully and without alteration of the antigens. The method permits the study of the electrophoretic mobility

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IMMUNOELECTROPHOROGRAMS OF SOLUBLE
ANTIGENS OF THE NEWCASTLE, FLEXNER,
AND BOYD DYSENTERY BACTERIA

- I. a, b Newcastle bacteria antigens.
 Trenches (1, 2, 3) Newcastle antisera.
- II. c, c Flexner 2a antigens;
 f Newcastle bacteria antigens.
 Trenches: (4) Flexner antiserum;
 (5) Newcastle antiserum.
- III. d, d S. boydii, Type 4 antigens.
 Trenches: (6) S. boydii, Type 4 antiserum;
 (7) S. boydii, Type I antiserum.
- IV. e S. boydii, Type 6 antigens;
 f Newcastle bacteria antigens.
 Trenches: (8) S. boydii, Type 6 antiserum;
 (9) Newcastle antiserum.

BACTERIOLOGICAL NOMENCLATURE
AND TAXONOMY

АНТИГЕН (Antigen)	АНТИЦИБОРОТКА 1 (Antiserum)
I	a
	b
II	c
	c
	b
III	d
	d
IV	e
	b

2

3

4

4

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6

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of the antigens and their immunological specificity, and, if supplemented with additional cytochemical techniques, it can provide information relative to the chemical nature of the antigens.

Using the immunoelectrophoretic method we have studied the antigenic structure of 6 Flexner strains belonging to Types 1b, 2a, 3, 4a, X, and Y; 18 strains of Shigella boydii (Types 1, 2, 4, 6, 8 and 15); and 16 strains of Newcastle bacilli (biochemical varieties Newcastle, Manchester, and Boyd 88). All the Flexner strains and most of the S. boydii strains were obtained from the International Dysentery Center, USA. The fermentation varieties of Newcastle bacteria were supplied by the State Control Institute of Medical and Biological Preparations, Moscow. Soluble antigens were prepared from each strain following disintegration of living cells by repeated freezing and thawing.

As the result of immunoelectrophoretic analysis it was found that the different serotypes of Flexner dysentery bacteria possess complex antigenic composition. Together with antigens common to all Enterobacteriaceae they have antigens characteristic of the genus Shigella (Flexner- and group-specific antigens). The characteristic feature of the Flexner-specific antigen is its electrophoretic mobility to cathode.

The antigenic structure of S. boydii differs from that of S. flexneri. The Boyd-specific antigen moves to the anode and is probably the K antigen.

The immunoelectrophoretic patterns of Newcastle bacteria closely resemble those produced by S. boydii. The Newcastle-specific antigen likewise travels to the anode. In addition to different electrophoretic mobilities the Flexner-, Boyd-, and Newcastle-specific antigens possess different immunological specificities. Furthermore, Newcastle bacteria have an antigen with slightly expressed cross-relationship to the somatic Flexner antigen. The related antigen moves to the cathode.

Thus, application of immunoelectrophoretic analysis to Flexner, Boyd, and Newcastle dysentery bacteria has added new data to our knowledge of their antigenic structure. The results reported seem to provide additional evidence in favour of the recognition of Newcastle bacteria as a distinct systematic entity, as is provided for in the Soviet Classification of the shigellae.

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