GENETIC RECOMBINATION IN INTESTINAL BACTERIA III. STUDY OF THE GENETIC STRUCTURE OF DYSENTERY BACILLUS HYBRIDS (SEROLOGICAL PROPERTIES)

TRANSLATION NO. 1154

August 1964

UNITED STATES ARMY
BIOLOGICAL LABORATORIES
Fort Detrick, Frederick, Maryland

CA-18-064-D4-00019(A) (T-208-2)
12 August 1964

Translation No. 1154

DDC AVAILABILITY NOTICE

Qualified requestors may obtain copies of this document from DDC.

This publication has been translated from the open literature and is available to the general public. Non-DOD agencies may purchase this publication from Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield, Va.

Technical Library Branch
Technical Information Division

GENETIC RECOMBINATIONS IN INTESTINAL BACTERIA
III. STUDY OF THE GENETIC STRUCTURE OF DYSENTERY BACILLUS HYBRIDS (SEROLOGICAL PROPERTIES)

/Following is the translation of an article by A. A. Abidov in the Russian-language publication Byulleten' Eksperimental'noy Biologii i Meditsiny (Bulletin of Experimental Biology and Medicine), No 9, 1963, pages 76-80./

From the laboratory of genetics of microorganisms (Director -- Doctor of Biological Sciences A. P. Pekhov) of the Institute of Experimental Biology (Director -- Professor I. N. Mayskiy) of the Academy of Medical Sciences USSR, Moscow and the Institute of Regional Experimental Medicine of the Academy of Sciences Uzbek SSR, Tashkent

(Received by editor 6 January 1963; presented by Full Member of the Academy of Medical Sciences USSR N. N. Zhukov-Vereshnikov)

In previous reports we presented information on isolation of 183 recombinants obtained by crossing the strains E. coli HfrH, HfrR, HfrC, and HfrHλ + with 35 Sh Flexneri cultures, together with data on their biochemical properties (1,2).

This report presents results of a serological examination of isolated lactosopositive recombinants of dysentery bacilli.

Experimental Methods

Serological properties of recombinants were determined by the generally accepted method, using the agglutination reaction on glass contained adsorption Flexner serum and monoreceptor sera (A, B, C, D. E, and F).

In addition, agglutinating sera to five Sh Flexneri cultures were prepared (by immunization of rabbits) (3584, titer 1:6400; 2050, titer 1:3200; 1363, titer 1:3200; 2047, titer 1:1600; 1570; titer 1:800), to four strains of E. coli HfrH, titer 1:3200;

HfrHλ + titer 1:1600; HfrR titer 1:400, HfrC titer 1:400) and to four recombinant strains (2050-p-4, titer 1:1600, 2047-b-5, titer 1:6400; 5008-p-5, titer 1:1600, 2055-b-1, titer 1:1600. The hemagglutination reaction was performed with the latter strains by means of their series dilution.

Experimental Results

All recombinants preserve the capacity to agglutinate antidysentery adsorbed Flexneri serum. After establishment of the agglutinability of the recombinants of polyvalent adsorbed Flexneri serum, their property of agglutinability was verified also with monoreceptor sera. It was established that the recombinants 5008-p-1 to 5008-p-12 cease to be agglutinated by the (original) antiserum of the f type and began to react with the antitypical sera "E" and "C". The recombinants 2047-p-1 to 2047-p-5, in addition to their original antiserum of the "C" type, began to be agglutinated with the type "A". The recombinants 2050-p-1 to 2050-p-28 lost their capacity of agglutinability by the original antiserum "B" and began to react with the type serums "C" and "A".

An exception is found in a single recombinant 2050-p-3, preserving the agglutinability of the original antiserum.

An analogous effect was noted in the hybrids 2043-p-1, 2048-p-1 to 2048-p-8.

The recombinants of dysentery Flexneri bacilli 3584, 628, 2055, 2047 preserve their property of agglutinability by the original antiserum "C".

Thus, the results of the agglutination reaction by monoreceptor sera demonstrates, in addition to the preservation of the agglutinability by the antisera of the original cultures, the possibility of one type of dysentery type of bacteria transforming into another.

In order to more graphically determine the serological kinship between the combinants and original cultures, we present below an amplified account of the hemagglutination reaction with the sera prepared.

From the table it is clear that the recombinants 5008-p-1 to 5008-p-12, 2047-p-1 to 2047-p-5, 2050-p-1 to 2050-p-28, 5030-p-1 to 5030-p-10, 845-p-1, 2, 3, 3584-p-1 to 3584-p-34, 621-p-1, 628-p-2, 2048-p-1, 2, 3, 4, 7, 2046-p-1 to 2046-p-14, 2044-p-1 to 2044-p-5, 75/2-p-1, 2, 828-k-1, 970-k-1, 2054-k-3, 4, 13, 16, 18, 23, 2046-m-1, 3584-m-1 to 3584-m-20, 2050-m-1 to 2050-m-14, 2-55-m-1, 2, 3, 4, 2055-b-1, 2, 3, 2047-b-1 to 2047-b-6 -- are agglutinated by the antidysentery sera 3584, 2050, 1363, 2047, and 1570 from 1:32 to complete titer. Thus, in spite of the fact that these cultures differ significantly from the original cultures in biochemical

Serological Properties of Intestinal, and Dysentery Bacilli and of their Recombinants

a) № п/п	b) Рекомбинанты	c) Антисыворотки											
		d) Дизентерийная					e) к E. coli				f) Рекомбинантные			
		2004 T I : 6400	2000 T I : 2000	1303 T I : 3200	2047 T I : 1600	1570 T I : 800	HfrH T I : 3200	HfrH+ T I : 1600	HfrR T I : 400	HfrC T I : 400	2050-p-4 T I : 1600	2047-6 T I : 6400	2005-p-5 T I : 1600	2055-6-1 T I : 1600
1	5008-p-1—5008-p-12, 2047-p-1—2047-p-5, 2050-p-1—2050-p-28, 5030-p-1—5030-p-10, 845-p-1, 2, 3, 3584-p-1—3584-p-3, 4, 621-p-1, 628-p-2, 2048-p-1, 2, 3, 4, 7, 2046-p-1—2046-p-14, 2044-p-1—2044-p-5, 75/2-p-1, 2, 828-x-1, 970-x-1, 2050-x-3, 4, 13, 16, 18, 23, 2046-x-1, 3584-x-1—3584-x-20, 2050-x-1—2050-x-14, 2055-x-1—2055-x-4, 2055-6-1, 2, 3, 2047-6-1—2047-6-6.	g) От 1/32 до 1/2 T	h) От 1/16 до полного титра	i) От 1/32 до полного титра	j) От 1/16 до 1/2 T	k) От 1/8 до 1/2 T	—	—	—	—				
2	2047-p-1—2047-p-5, 2050-p-1—2050-p-28,. 5030-p-1—5030-p-10, 845-p-1, 2, 3, 3584-p-1—3584-p-34, 621-p-1, 628-p-2, 2048-p-1—2048-p-4, 7, 2046-p-1—2046-p-14, 2044-p-2, 3, 4, 5, 75/2-p-1, 2, 828-x-1, 970-x-1, 2050-x-1, 2047-x-4, 5, 3584-x-1—3584-x-20, 2050-x-1, 2050-x-14, 2055-x-1, 2, 3, 4, 2055-6-1, 2, 3, 2047-6-1—2047-6-6										l) От 1/32 до полного титра	m) От 1/8 до полного титра		n) От 1/32 до полного титра
3	5008-p-1—5008-p-12, 5030-p-1—5030-p-10, 845-p-1, 2, 3, 3584-p-1—3584-p-34, 2055-6-1, 2, 3												i) От 1/32 до полного титра	

LEGEND: a) recombinant number; b) recombinants; c) antisera; d) dysentery; e) to E. coli; f) recombinants; g) from 1-32 to 1/2 T; h) from 1/16 to complete titer; h) from 1/32 to complete titer; j) from 1/16 to one-half T; k) from 1/8 to 1/2 T; l) from 1/8 to complete titer; m) original cultures of Sh. Flexneri; n) as above: HfrH λ +

[Legend also applies to table on following page]

CONTINUATION:
[See Legend on page 67]

№ п/п (g)	(b) Рекомбинанты	(c) Антисыворотки: (d) дизентерийные 3884 T 1 : 6400	2050 T 1 : 3200	1363 T 1 : 3200	2047 T 1 : 1600	1570 T 1 : 800	(e) к E. coli HfrH T 1 : 3200	HfrHλ+ T 1 : 1600	HfrR T 1 : 400	HfrC T 1 : 400	(f) рекомбинантные 2050-p-4 T 1 : 1600	2047-6-5 T 1 : 6400	5008-p-5 T 1 : 1600	2050-6-1 T 1 : 1600
4	Исходные культуры Sh. Flexneri: 3884	T					—	—	—	—	1/4 T	1/8 T	1/8 T	1/4 T
5	Исходные культуры Sh. Flexneri: 2050		T				—	—	—	—	1/2 T	1/8 T	1/8 T	1/2 T
6	Исходные культуры Sh. Flexneri: 1363			T			—	—	—	—	1/4 T	1/8 T	1/4 T	1/4 T
7	Исходные культуры Sh. Flexneri 2047				T		—	—	—	—	1/2 T	1/4 T	1/8 T	1/4 T
8	Исходные культуры Sh. Flexneri 1570					T	—	—	—	—	1/4 T	1/8 T	1/4 T	1/4 T
9	E. coli HfrH	—	—	—	—	—	T				—	—	—	—
10	То же HfrHλ+	—	—	—	—	—		T			—	—	—	—
11	» » HfrR	—	—	—	—	—			T		—	—	—	—
12	» » HfrC	—	—	—	—	—				T	—	—	—	—

properties, in nigh titers they are agglutinated by antidysentery sera.

At the same time the zoological kinship between the recombinants themselves was verified by carrying out an agglutination reaction with the corresponding antisera (homologous). The result obtained allowed us to separate recombinants into two groups.

The first group included the cultures 2047-p-1 to 2047-p-5, 2050-p-1 to 2050-p-28, 5030-p-1 to 5030-p-10, 845-p-1, 2, 3, 3584-p-1 to 3584-p-34, 621-p-1, 628-p-2, 2048-p-1, 4, 7, 2046-p-1 to 2046-p-14, 2044-p-2, 3, 4, 5, 75/2-p-1, 1, 2, 828-k-1, 970-k-1, 2049-m-1, 2047-m-6, 8, 3584-m-1 to 3584-m-20, 2050-m-1 to 2050-m-14, 2055-m-1, 2, 3, 4, 2055-b-1, 2, 3, 2047-b-1 to 2047-b-6. The cultures listed entered into the agglutination reaction with antisera to the recombinant 2054-p-4 from 1:8 to complete titer, with the antiserum to the recombinant 2047-b-5 from 1:32 to complete titer, and with the antiserum to the recombinant 2055-b-1, also from 1:32 to complete titer.

The second group of strains includes the cultures 5008-p-1 to 5008-p-12, 5030-p-1 to 5030-p-10, 845-p-1, 2, 3, 3584-p-1 to 3584-p-34, 2055-b-1, 2, 3, which are agglutinated by antiserum to the recombinant 5008-p-5 from 1:32 to complete titer.

The recombinants studied, as well as the original strains of dysentery causative agent show serological kinship, which evidences that they belong to the same serological group.

We further verified the serological relationship between the original dysentery, intestinal bacilli, and their recombinants. We noted that strains of dysentery bacilli Flexneri 3584, 2050, 2047, 1363, 1570 enter into the reaction of agglutination by antisera of the recombinants 2050-p-4, 2047-b-5, 5008-p-5, 2055-b-1 in dilutions from 1:8 to 1:2 titers.

We must emphasize that not a single Sh Flexneri strain entered into reaction with the antiserum to E. coli, and vice versa.

A serological relationship was noted in the opposite direction, that is, between Sh. Flexneri and their recombinants.

Thus, although dysentery bacteria hybrids differed considerably in biochemical properties from dysentery bacteria, they still retained the antigenic properties of the original strains. Our data agrees with the results of Luria and Burrous (3).

LITERATURE

1. Abidov, A. A. Byulleten' eksperimental'noy biologii (Bulletin of Experimental Biology), 1963, No 6, page 72.
2. Pekhov, A. P., Abidov, A. A. op. cit., No 5, page 88.
3. Luria, S., Burrous, J., Journal of Bacteriology, 1957, Vol 74, p 461.