

GENETIC RECOMBINATIONS IN INTESTINAL BACTERIA

REPORT II. STUDY OF THE GENETIC STRUCTURE OF DYSENTERY BACILLUS HYBRIDS (BIOCHEMICAL PROPERTIES AND MOTILITY)

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In a previous report, information was presented on the formation of 183 recombinates, obtained by means of crossing the *E. coli* strains, HfrH, HfrR, HfrC and Hfr λ + with 35 cultures of *Sh. Flexneri* [1].

In this work, we present the results of studying the obtained lactose-positive recombinates of the dysentery bacillus with the purpose of elucidating other biochemical properties and motility.

EXPERIMENTAL METHOD

The biochemical properties of the recombinates were determined according to the widely accepted method, employing the complete multicolored series (lactose, glucose, mannitol, maltose, sucrose, arabinose, xylose, rhamnose, raffinose, galactose, dulcitol and sorbitol).

To determine the motility of the bacteria, an 18-hour old culture of the recombinates was stab steered in meat-peptone bouillon containing 0.54-0.75% agar, at a pH of 7.4 [2], after which the test tubes were placed in an incubator for 24 hours.

EXPERIMENTAL RESULTS

The data on the biochemical properties of the original strains of *E. coli*, *Sh. Flexneri*, and their hybrids, are presented in the table. The starting cultures of the *E. coli* did not form hydrogen sulfide in meat-peptone bouillon, but did form indole. In the complete, multicolored series, they fermented lactose, glucose, mannitol, maltose, arabinose, xylose, rhamnose, galactose, dulcitol and sorbitol, with the formation of acid and gas. The cells of all the strains were non-motile.

Flexner's dysentery bacilli did not form indole or hydrogen sulfide, and were non-motile. Strains No. 5030, 5008, 3584, 2055, 730, 2049, 2773, 970, 1 and 2055 split glucose, mannitol and galactose, down to acid. Cultures of No. 2047, 2048, 2043, 2044, 628, 828, 2046, 75/2, 845 and 1363 broke down glucose, mannitol, maltose and galactose, also only producing acid. Strain No. 2050 fermented glucose, mannitol, galactose and dulcitol down to acid without gas. Strains No. 621 and 866 fermented glucose, mannitol, galactose and sorbitol, also down to acid.

Cultures of the recombinates from 2047-p-1 to 2047-p-5, from 2050-p-1 to 2050-p-14, from 845-p-1 to 854-p-3, from 3584-p-1 to 3584-p-34, 621-p-1, 628-p-2, from 2048-p-1 to 2048-p-7, from 2046-p-1 to 2046-p-14, from 2044-p-2 to 2044-p-5 to 75/2-p-2, 970-k-1, 828-k-1, 2050-k-3, 2050-k-4, 2050-k-13, 2050-k-16, 2050-k-23, from 3584-m-1 to 3584-m-20, from 2050-m-1 to 2050-m-14, from 2055-m-1 to 2055-m-4, from 2055-b-1 to 2055-b-3, and from 2047-b-1 to 2047-b-6, fermented lactose, glucose, mannitol, arabinose, galactose and rhamnose with the formation of acid without gas. They did not form indole or hydrogen sulfide, and were non-motile.

Biochemical Properties of Intestinal and Dysentery Bacilli and Recombinates

Cultures	In- dole	Lac- tose	Glu- cose	Mann- itol	Mal- tose	Su- crose	Ara- binose	Xylose	Rhamnose	Raffi- nose	Galac- tose	Dulcitol	Sor- bitol	Motility
<i>E. coli</i> HfrH, HfrR, HfrC, Hfrλ + Flexner's dysentery bacillus No. 5008, 5030, 3584, 2055, 730, 2049, 2773, 970, 1 and 2055	+	kΓ	kΓ	kΓ	kΓ	-	kΓ	kΓ	kΓ	-	kΓ	kΓ	kΓ	+
Flexner's dysentery bacillus No. 2047, 2048, 2043, 2044, 628, 828, 2046, 75/2, 845 and 1363	-	-	k	k	-	-	-	-	-	-	k	-	-	-
Flexner's dysentery bacillus No. 2050	-	-	k	k	k	-	-	-	-	k	k	-	-	-
Flexner's dysentery bacillus No. 621 and 866	-	-	k	k	k	-	-	-	-	k	k	-	-	-
Recombinates from 5008-p-1 to 5008-p-12	-	k	k	k	k	-	k	-	k	-	k	-	k	-
Recombinates from 2047-p-1 to 2047-p-5, from 2050-p-1 2050-p-14, from 845-p-1 845-p-3, from 3584-p-1 3584-p-34, 621-p-1, 628-p-2, from 2048-p-1 to 2048-p-7 from 2046-p-1 to 2046-p-14, from 2044-p-1 to 2044-p-5, from 75/2-p-1 to 75/2-p-2, 970-p-1, 2050-k-1, 2050-k-8, 2050-k-4, 2050-k-13, 2050-k-16, 2050-k-23, from 3584-m-1 to 3584-m-14, from 2055-m-1 to 2055-m-14, 2055-b-1, 2055-b-3, from 2047-b-1, to 2047-b-6	-	k	k	k	k	-	k	-	k	-	k	-	-	-

Symbols: k) formation of acid; kΓ) formation of acid and gas; +) positive reaction; -) negative reaction.

In comparison with the original cultures, these recombinates fermented lactose, arabinose and rhamnose down to acid without gas, while the recombinates 5008-p-1, and 5008-p-12, in addition to the described sugars, broke down sorbitol to acid.

Thus, as a result of crossing, we noted transmission of a number of biochemical properties from the colon bacilli, which are sexually differentiated, to the dysentery bacilli.

Our data coincides with the results of Luria and Burrows [3].

Data on the transmission of other properties from the colon bacteria to the dysentery bacilli will be presented in subsequent reports.

SUMMARY

As a result of crossing there was transmission of a number of biochemical properties to dysentery bacilli from the sexually differentiated *E. coli*. The data obtained coincided with those of Luria and Burrows. *Sh. flexneri* recombinates obtained by the author acquired the property of fermenting lactose, arabinose and rhamnose, with formation of acid, without gas.

LITERATURE CITED

1. A. P. Pekhov and A. A. Abidov, *Byull. eksper. biol.*, No. 5, (1963) p. 88.
2. V. I. Shanina-Vagina, in the book: *Multivolumed Manual on the Microbiology, Clinical Aspects and Epidemiology of Infectious Diseases* [in Russian]. Moscow, Vol. 1, (1962) p. 329.
3. S. Luria and J. Burrows, *J. Bact.*, Vol. 74, (1957) p. 461.

All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
