IN VIVO CHANGE OF SEROLOGICAL SPECIFICITY IN *SHIGELLA FLEXNERI*C. DAVID MCGUIRE¹ AND THOMAS M. FLOYD

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Luria and Burrous (J. Bacteriol., **74**, 461, 1957) have described *in vitro* hybridization between *Escherichia coli* and *Shigella flexneri* in which serological changes occurred in the hybrids. The present report describes an *in vivo* change in serological specificity from *S. flexneri* 3 to *Shigella sonnei*, phase 2.

In an attempt to produce a mouse virulent strain of a *Shigella*, a long term infection with *S. flexneri* 3, strain F 824a (streptomycin and oxytetracycline resistant), was established in the intestinal tract of albino mice. This was accomplished by a method similar to that described by Freter (J. Exptl. Med., **104**, 411, 1956) in which antibiotic suppression of normal intestinal flora was followed by substitution with an antibiotic resistant shigella flora. Fecal cultures were made periodically for the isolation of *Shigellae*. The recovery of the test organism from the feces in two separate experiments is shown in table 1. On the 23rd day in the first experiment, organisms biochemically and serologically identified as *S. sonnei* phase 2, were isolated from 17 out of 50 mice. On the 25th day the *S. sonnei* serotype was recovered from the feces of 47 out of 50 mice. In the second experiment, on the 23rd day of the infection, 3 out of 26 cultures were identified as *S. flexneri* 8 (or Y); and on the 38th day, 3 out of 10 cultures were identified as *S. sonnei* phase 2.

The cultures identified as *S. sonnei* were serologically stable through six transfers on artificial medium. They were resistant to 200 µg/ml of streptomycin and 100 µg/ml of oxytetracycline, just as the "parent" *S. flexneri* 3

TABLE 1

Recovery of *Shigella flexneri* 3 and *Shigella sonnei* from feces of mice

Days Post Challenge	No. of <i>S. flexneri</i> 3 and <i>S. sonnei</i> Isolates per No. of Mice Cultured			
	Expt 1		Expt 2	
	<i>S. flexneri</i>	<i>S. sonnei</i>	<i>S. flexneri</i>	<i>S. sonnei</i>
1	44/50	0/50	16/26	0/26
2	41/50	0/50	11/26	0/26
3	22/50	0/50	—	—
4	11/50	0/50	—	—
7	11/50	0/50	16/26	0/26
9	32/50	0/50	17/26	0/26
14	28/50	0/50	14/26	0/26
17	11/50	0/50	—	—
23	2/50	17/50	2/26	0/26
25	—	47/50	—	—
38	—	—	2/10	3/10

had been for over 12 months. The experimental mice were isolated from any chance exposure to *S. sonnei*, and, in over a year's study of shigella infections in mice, *S. sonnei* has never been found as a naturally occurring organism in mouse feces.

No evidence exists to indicate the pathway by which the change in serological specificity occurred. Its occurrence in two completely separate, though identical experiments, conducted at intervals of two months, is highly suggestive that a mutation, or hybridization between *S. flexneri* 3 and *E. coli* or other normal intestinal organism, occurred. Such an occurrence, as suggested by Luria, is a possible explanation of the evolution of the *Enterobacteriaceae* and the origin of intermediate strains of *Shigella* serotypes.

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