

UNUSUAL PATTERNS OF ANTIBIOTIC RESISTANCE FROM A CLINICALLY ISOLATED R-FACTOR

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It is common for clinical strains of antibiotic resistant bacteria to harbour R-factors. Consider an organism with R-factor mediated resistance to four drugs. If these resistances are borne on a single R-factor then on mating all four resistances will transfer as a unit. If there are two R-factors the resistances will transfer as two independent groups. Let us suppose a strain with two R-factors transfers one of them at a rate of 10^{-5} per input donor and the other one at a rate of 10^{-6} per input donor, then only very rarely would an individual recipient cell receive both R-factors.

An *Escherichia coli* harbouring an R-factor, which we term R_{SS28} , was isolated from a patient suffering from an urinary tract infection which had failed to respond to co-trimoxazole therapy. R_{SS28} was transferred to a laboratory strain of *E. coli* J62-1 using trimethoprim (Tm) selection, and resistance to Tm, Spectinomycin (Sp), Sulphonamide (Su) and Streptomycin (Sm) was found in the recipient strain. At this stage R_{SS28} seemed to be a single R-factor. However, when J62-1 (R_{SS28}) was mated with another laboratory recipient, strain J53-2, the following results were obtained.

Table 1:

Selective drug	Type	Resistance patterns				transfer rate per input donor
		Tm	Sp	Su	Sm	
Tm	1	+	+	+	+	1.65×10^{-6}
	2	+	+	-	-	0.15×10^{-6}
Sp	3	-	+	+	-	2.26×10^{-4}
Su	4	-	+	+	+	0.61×10^{-4}
	5	-	+	+	-	2.63×10^{-4}
	6	-	-	+	+	3.1×10^{-4}
Sm	7	-	+	+	+	0.2×10^{-4}
	8	-	-	+	+	2.1×10^{-4}

+ = resistance found in recipient, - = resistance absent from recipient

As before the Tm result (type 1) would seem to suggest that we are dealing with a single R-factor conferring resistance to all four drugs. However, the other results would seem to suggest that there are two R-factors, one conferring resistance to Tm Sp (type 2) and another conferring resistance to Su Sm (types 6 and 8). However, types 3 and 5 which received Sp Su suggest a third R-factor. This last R-factor would seem to occur together with an Su Sm R-factor to give types 4 and 7. These results are puzzling because (i) the patterns of resistance do not fit into clear cut linkage groups and (ii) the frequencies of the co-transfer of three or four resistances seem too high.

Types 4 and 7 were analysed further. It was found as forecast that when they were mated with other recipients these received either Sp Su (types 3 and 5) or Su Sm (types 6 and 8) or all three resistances together.

As R_{SS28} seems to be comprised of three R-factors, i.e. Tm Sp, Sp Su and Su Sm it is possible that there were two different Sp genes and two different Su genes in the original strain.