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Gene Webb  
*Marquette University*

Kalpana Rohatgi  
*Marquette University*

James B. Courtright  
*Marquette University*, james.courtright@marquette.edu

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Location of gyrA on the Physical Map of the Escherichia coli Chromosome

GENE WEBB, KALPANA ROHATGI, AND JAMES B. COURTRIGHT*
Department of Biology, Marquette University, Milwaukee, Wisconsin 53233

Three oligonucleotide probes with sequences corresponding to either the coding sequence or the complementary sequence of gyrA (6, 7) at nucleotide positions 295, 343, and 524 were synthesized. These oligomers were separately labeled at their 5' ends with $^{32}$P and hybridized to phage DNA prepared from the $\lambda$ miniset phages 371 through 377 (4). Each of the three probes hybridized only to E13A5 (phage 376). pAW012, which contains an EcoRV genomic fragment containing the gyrA gene (7), hybridized to 4F12 (phage 375) as well as to E13A5. The pAW012 BamHI-HindIII fragment, which contains only the first 692 nucleotides for the gyrA gene (6, 7), did not hybridize to 4F12. The gyrA gene contains restriction sites for HindIII, KpnI, PstI, and PvuII but none for the other four enzymes used for defining sites in the recombinant phage collection (4). This combined information identifies the HindIII site at nucleotide 692 of gyrA with the leftmost HindIII site of the E13A5 insert. The fact that the oligonucleotides hybridized with this phage, whereas pAW012 also hybridized to phage strain 4F12, places the gyrA gene, map position 48.3 min (1), at coordinate 2350 (5) immediately to the left of ubiG and with an orientation the same as that of ubiG (2) but opposite that of the atoAB (3) operon at coordinate 2334 (Fig. 1). There was no inconsistency in terms of restriction sites, and the sizes of cloned genes were in good agreement with the restriction map (4, 5).

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LITERATURE CITED

* Corresponding author.

FIG. 1. Organization of the region encompassing coordinates 2330 to 2360 of the Escherichia coli chromosome. The coordinates of atoAB, gyrA, ubiG, and nrdAB at BamHI (B), EcoRI (R), and HindIII (H) sites are 2336.5, 2350, 2352.6, and 2357.68, respectively, on the basis of the corrected restriction map (5).

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