Genetics of Bacterial Virulence

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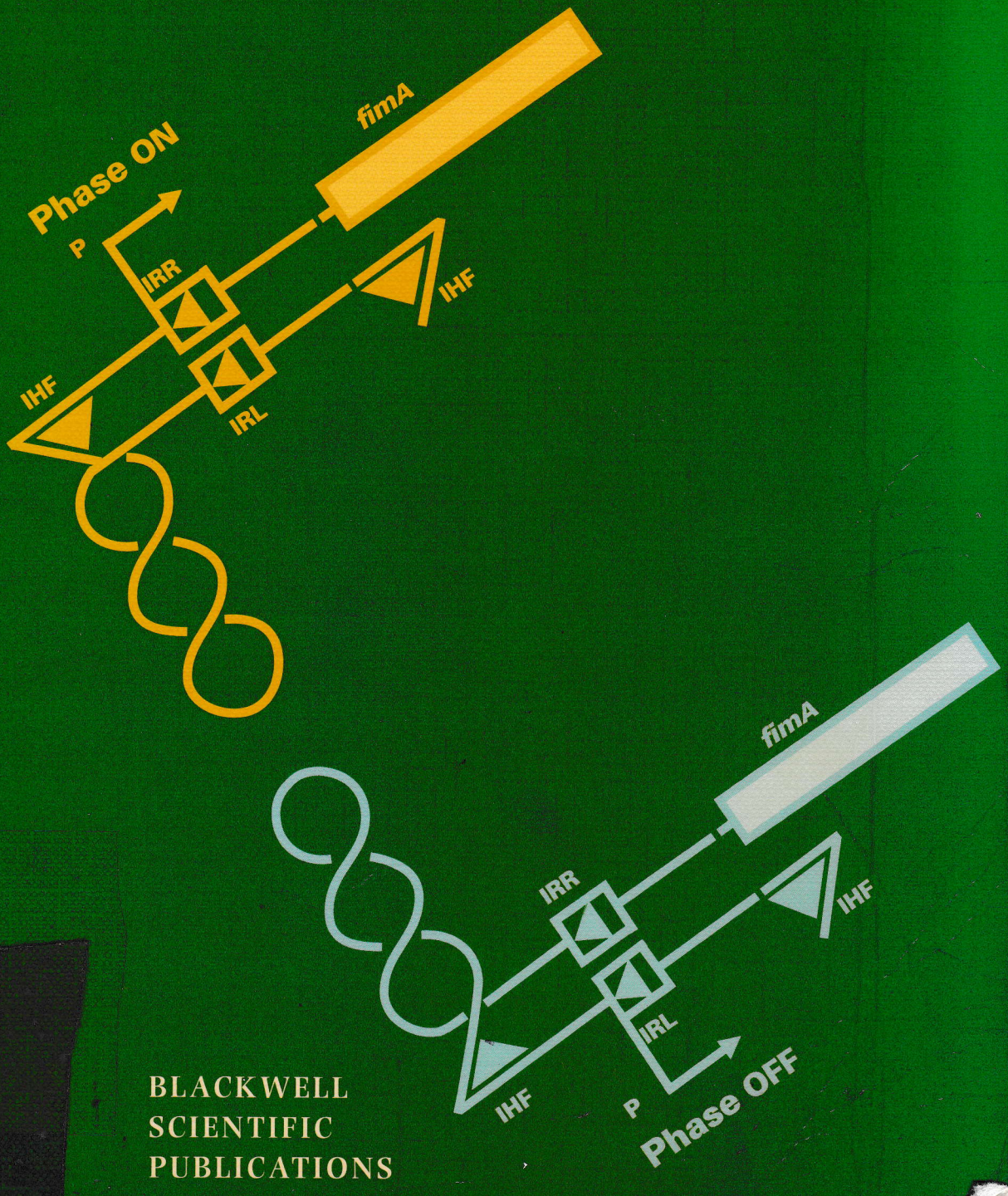

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Genetics of Bacterial Virulence

Understanding the precise mechanisms by which bacteria cause infection remains a daunting challenge to science and medicine. Powerful new theories and techniques in molecular genetics are now enabling us to come within reach of a deeper understanding which will eventually result in our developing preventative and therapeutic remedies.

This book looks at microbial pathogenesis by examining how bacteria respond to changing environmental conditions by altering the expression of their genes within a global regulatory system.

The molecular genetic basis of virulence is examined in a variety of bacteria such as *Staphylococcus aureus*, *Salmonella typhimurium*, *Vibrio cholerae*, *Agrobacterium tumefaciens* and *Listeria monocytogenes*. Individual chapters concentrate on transcriptional control and gene expression, gene control networks and global regulation. The reader will gain an appreciation of bacterial virulence right down to the level of DNA topology and supercoiling. Pathogenesis is shown to be itself a consequence of microbial evolutionary survival.

COVER ILLUSTRATION

The cover illustration shows the phase variable expression of *fimA*, the *Escherichia coli* structural gene encoding the type 1 fimbrial subunit. The angled arrow labelled P represents the *fimA* promoter. This is carried on a 314 base pair segment of invertible DNA flanked by 9 base pair inverted repeats (inverted repeat right (IRR) and inverted repeat left (IRL), respectively). Site-specific recombination across IRR and IRL causes promoter segment inversion, resulting in transcription (Phase ON) or non-transcription (Phase OFF) of *fimA*. The bulk of the invertible DNA is shown as a negatively supercoiled structure. Binding of integration host factor (IHF) protein influences the efficiency of recombination and is thought to result in sharp bending of the DNA within the invertible segment upstream of the promoter and of the DNA outside IRL.

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