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**Mobile Genetic Elements:
Structure, Classification, and
Mechanisms**

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1. Introduction to Mobile Genetic Elements

1.1. What Are Mobile Genetic Elements?

Mobile genetic elements are discrete DNA entities that can move within a genome, between replicons in the same cell, or between bacterial cells. They include insertion sequences, transposons, integrons, gene cassettes, plasmids, prophages, integrative and conjugative elements, integrative mobilizable elements, genomic islands, pathogenicity islands, and hybrid elements that combine features of more than one class. In the broadest sense, MGEs form the bacterial mobilome: the mobile component of the genome that allows bacteria to sample, rearrange, and disseminate genetic information more rapidly than vertical inheritance alone would permit. Tokuda and Shintani (2024) define MGEs as DNA molecules capable of moving either between replicons, which is intracellular mobility, or between bacterial cells, which is intercellular mobility; their overview places plasmids, ICEs, transposons, integrons, insertion sequences, and bacteriophages within a unified framework of bacterial horizontal gene transfer. Classic and contemporary reviews similarly frame MGEs as central agents of bacterial genome plasticity, adaptation, and antimicrobial resistance dissemination (Frost et al., 2005; Partridge et al., 2018).

Structurally, MGEs range from minimal insertion sequences of roughly one kilobase, encoding little more than a transposase flanked by inverted repeats, to large conjugative plasmids and ICEs carrying replication, maintenance, conjugation, regulation, and cargo modules. Insertion sequences and transposons generally encode enzymes that recognize terminal repeats and catalyze movement into new DNA sites. Integrons differ because they are not primarily transposition systems; instead, they are recombination platforms that capture gene cassettes through an integrase-mediated reaction at att sites, often placing