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Demonstration of horizontal gene transfer through plasmid transport

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Background: Increased industrialization and modern agricultural practices have left persistent toxic heavy metals in the environment, which are of great threat to the eco-system. Unlike many organisms, bacteria share their DNA with one another in exchange unrelated to reproduction. Environment of multiple stress create a selective pressure, which in turn leads to the mutations in microorganisms that will allow them to survive and multiply. Thus it would be more favorable for the survival of bacterium to acquire multiple stress resistance.

Materials and Methods: The aim of the present study is to monitor horizontal gene transfer of plasmid-determined stress tolerance under lab conditions. *E. cloacae* (DGE50) & E. coli (DGE57) were used throughout the study. Samples were collected from contaminated water and soil to isolate bacterial strains having tolerance against heavy metals and antibiotics.

Results: We have demonstrated plasmid transfer, from Amp+Cu+Zn- strain (DGE50) to Amp-Cu-Zn+ strain (DGE57), producing Amp+Cu+Zn+ transconjugants (DGETC50→57) and Amp+Cu-Zn+ transformants (DGE TF50→57). DGE57 did not carry any plasmid, therefore, it can be speculated that zinc tolerance gene in DGE57 is located on chromosome. DGE50 was found to carry three plasmids, out of which two were transferred through conjugation into DGE57, and only one was transferred through transformation. Plasmid transferred through transformation was one out of the two transferred through conjugation. Though the results of transformation it was revealed that the genes of copper and ampicillin tolerance in DGE50 are located on separate plasmids, since only ampicillin tolerance genes were transferred through transformation as a result of one plasmid transfer.

Conclusions: By showing transfer of plasmids under lab conditions and monitoring retention of respective phenotype via conjugation and transformation, it is very well demonstrated how multiple stress tolerant strains are generated in nature.

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