

## Artificial Transcription Factors for Genomic Studies and Industrial Applications

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We have developed a method that uses libraries of zinc finger-containing, artificial transcription factors to induce phenotypic variations in yeast and cells. The modular structure and diverse DNA-binding specificities of zinc finger domains make them ideal building blocks for artificial transcription factors. By linking multiple zinc finger domains together, we constructed more than  $10^5$  zinc finger proteins with diverse DNA-binding specificities and fused each of them to either a transcriptional activation or repression domain. The resulting transcriptional regulatory proteins were expressed individually in cells, and the transformed cells were screened for drug resistance, thermotolerance, osmotolerance, and growth inhibition. Novel gene associated with drug resistance was identified by microarray analysis of mutant phenotype. Our results show that artificial transcription factors are powerful tools for functional genomics and phenotypic engineering.