Synthetic Protein Functions for Nucleic Acid Targeting

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DNA-binding proteins that discriminate between cytosine and 5-methylcytosine (mC) are important analytical tools in epigenetics. However, proteins currently in use are either not sequence-selective or exhibit sequence constraints, which restricts the flexibility and resolution of locus-specific mC-detection. We report that transcription-activator-like effectors (TALEs) enable the highly resolved detection of mC at user-defined loci within large, eukaryotic genomes. Their free programmability of sequence-recognition makes TALEs a general alternative to nucleic acid probes in a wide range ofgenomics techniques that offer the direct and simultaneous read-out of both the genetic and epigenetic information of DNA.