Nick Translation Reaction Encyclopedia Article

Nick Translation Reaction

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Contents

Nick Translation Reaction Encyclopedia Article.....1

Contents.....2

Nick Translation Reaction.....3

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Molecular biologists use a specialized technique termed nick **translation** to label double stranded **DNA** molecules. The technique prepares the DNA molecules for further **blotting analysis** studies (e.g., Southern and Northern blotting analysis).

The nick translation reaction is mediated by two critical **enzymes** that work, one after another, along the DNA molecule. In the first of the two reactions, one strand of DNA is nicked or cut by a Dnase (deoxyribonuclease I). The second enzyme critical to the reaction, E. coli **polymerase** I, aids in the addition of deoxynucleotides to the DNA molecule at the 3' (three prime) end of the nick or cut generated during the first part of the nick reaction. At the same time that the deoxyribonucleotides are added to the DNA strand at the 3' end of the nick, an exonuclease cuts deoxyribonucleotides from the 5' end of the nick.

The net effect of this cutting and removal of deoxyribonucleotides is a generalized rolling movement of the nick along the DNA strand in the direction of the 5' end of the nick from the 3' end of the nick. When scientists add labeled deoxynucleotide triphosphates to the medium, these easily identifiable molecules become incorporated into the molecules (**nucleotide**) residues being added to the original DNA molecule.

Following the labeling of the DNA molecule with radionucleotides (e.g., 32P deoxynucleoside triphosphates) the molecules are then ready for blotting analysis during which scientists transfer use the techniques of electrophoresis to separate component molecules. Once the molecules are separated they may be probed for specific proteins, nucleic acids, or particular sequences of amino acids or nucleotides.