SUMMARY

Regulation of expression of \textit{nif} genes by DNA supercoiling has been studied. It was found that the \textit{nif} gene cluster carried by the plasmid pRD1 needs DNA gyrase for its expression. Out of 17 (now 20) \textit{nif} genes only \textit{nifLA} promoter appears to be supercoiling dependent. Expression of the \textit{nifLA} promoter in \textit{E. coli} was found to be oxygen sensitive. This correlates the possible role of DNA gyrase or of supercoiling, in oxygen regulation of \textit{nif} genes (Dimri and Das, 1988). The \textit{gyrA} gene from \textit{K. pneumoniae} has been cloned and sequenced and a possible regulatory mechanism involving a natural cruciform structure in the promoter has been identified. Presence of a DNA binding protein having affinity to \textit{gyrA} promoter of \textit{K. pneumoniae} also has been demonstrated. This would be finally a fine regulatory control over the \textit{nif} gene expression. Apart from \textit{nif}, this regulation appears to be of global significance in \textit{K. pneumoniae} as well as in \textit{E. coli}. The \textit{gyrA} gene from \textit{A. vinelandii} has also been cloned. In \textit{A. vinelandii}, indirect indication for a third topoisomerase activity has also been obtained accidently, which appears to be related to the \textit{gyrA} gene. By Tn5 mutagenesis, six \textit{nif} mutants have been obtained. These mutants have been characterized and putative regulatory mutants have been identified. One of
these regulatory mutants could be of the nif specific ntr genes. Evidence for additional ntr genes (ntrB and ntrC or ntrBC), has been obtained. Detailed characterization of these mutants and complementing genes would help in understanding the regulation of nif genes in A. vinelandii.