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LABORATORY OF MOLECULAR BIOLOGY

Head: Dr. Mitsuru Takanami

This laboratory was established to expand researches of molecular biology in the late Hayaishi laboratory in 1968, and Dr. M. Takanami has since been in charge of this laboratory. Until March 1976, Dr. O. Hayaishi who is professor of Faculty of Medicine also supervised activities of this laboratory as a concurrent professor.

The major project of this laboratory has been focussed on analysis of DNA information required for initiation and termination of transcription. DNA of a small bacteriophage, named fd, was chosen for this purpose, since this DNA is only 6,200 nucleotides long and contains information enough to code eight proteins. The first several years the effort was concentrated to characterize the transcription system, and the transcription units on fd DNA as well as the positions of transcription start (promoter) and stop (terminator) were consequently determined.

The next step of research was the isolation of DNA segments containing promoter and terminator regions. For this purpose, attempts were made to cleave fd DNA into unique segments by the use of restriction endonuclease, which is not known to cleave double-stranded DNA by recognizing a unique sequence. At that time, however, only one species of restriction endonuclease was available, and that enzyme introduced only a single cut in fd DNA. Accordingly, a number of bacterial strains were surveyed to find other such enzymes but with different specificities. In 1972, three new enzymes which specifically cleave fd DNA into smaller pieces were isolated. By the discovery of these enzymes, a cleavage map of fd DNA was constructed, and as a consequence, short DNA segments containing promoter and terminator regions were isolated. In the meanwhile, the method for sequencing DNA was introduced, and in 1974, the sequence of a promoter region was successfully determined. In 1975, more sequence information about promoter and terminator regions was obtained. As of October 1976, research work is being concentrated to define the structure essential for promoter and terminator function in fd DNA, and also to gain sequence information on promoter and terminator of other DNA molecules.

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