

DNA FINGERPRINTING

The discovery of polymorphism in the genome of animals and micro-organism can be exploited for typing of the individuals at the level of DNA called DNA fingerprinting or molecular typing or molecular characterization. DNA fingerprint was first developed in human by Alec Jeffreys in 1985. Two years later same technique was applied for DNA fingerprinting of birds by Burke and Bruford in 1987.

Later on the same technique was extended to molecular characterization of farm animals that assisted in marker assisted selection. The molecular typing of microbial pathogens gave birth to a new discipline called molecular epidemiology.

Basically there are three ways by which the molecular typing is done:

1. Restriction endonuclease guided DNA fingerprinting (also called RFLP (Restriction Fragment Length Polymorphism)): The restriction endonucleases cut the DNA in the specific site called restriction site. The restriction site is the specific sequence of the nucleotides that is recognized by the restriction endonuclease and makes the cut over there. The position of restriction site varies with individuals as a result when the DNA of two different individuals of same species is taken and subjected to restriction endonuclease; they generate different type of fragments based on the variation of position of restriction site.
2. DNA sequencing: as the DNA sequence of two different individual cannot be the same. The sequencing of DNA obtained from two different individual will be different and thus can be typed based on their DNA sequence.
3. Polymorphic repetitive DNA sequences: the repetitive DNA sequences are the DNA sequences not present inside the genes with no known function in the genome. These repetitive DNA sequences repeat themselves in the genome. The number of repeats of these repetitive DNA sequences varies from one individual to another that forms the basis of DNA typing.

Application:

1. Forensic applications: identification of criminal based on the biological materials obtained in the crime scene.
2. Molecular characterization of farm animals and poultry birds having proven genetic worth.
3. Molecular epidemiology: detection of molecular types of infectious organism and detection of line of transmission of infection.