

Forensic DNA Issues

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Blood, Sweat and Tears

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Brief Outline of the Science of Forensic DNA Typing

DNA encodes all of the information and instructions necessary to create the organism and maintain its various functions. DNA of two animals of the same species will thus be largely identical: DNA profiling looks at the 0.1% of human DNA that is variable to develop differing “profiles” for individuals.

Most human body cells contain nuclei, and nuclear DNA is thus found in blood, semen, saliva, urine, hair roots, teeth, bone, tissues, organs, and skin cells. It is also found in epithelial cells, located in the linings of the body including the inside of the cheeks.

DNA profiling looks at various locations or “loci” within the DNA. There are known to be certain loci that have significant variability from person to person, and it is a small sub-set of those that DNA tests examine.

DNA typing analysis examines what are known as STR’s, or short tandem repeats, which are patterns of repeated blocks that are found at the loci. The DNA analysis involves counting the number of repeated STR’s at a given locus. An “allele” is the name given to the DNA at the locus being examined. At each locus there are two alleles, one contributed by each parent. As an example, if at a given locus there are at a given allele ten repetitions of the STR, and at the second allele the STR is repeated twelve times, then the DNA profile at that locus is represented numerically as 10, 12. The DNA “profile” of an individual is thus, for nine-loci testing, 9 pairs of numbers, plus an indicator of gender.

Forensic DNA analysis involves a comparison of known DNA profiles to those found on exhibits. In the Pickton case, the process of development of an investigative database of known profiles was an enormous endeavour. The DNA profiles of the large number of women who had gone missing in Vancouver over a period of many years were, for the most part, obtained by the police accessing and testing slides from pap smear tests, which slides had been stored by the British Columbia Cancer Agency. The Cancer Agency’s records tracking the slides and their origins were admirably detailed and comprehensive. Police also obtained details from the doctors and nurses who had taken the pap smears as to their usual procedures in such tests. For most of the missing women, the evidentiary values of the profiles obtained were strengthened by the fact of there being identical DNA results from multiple pap smear slides.