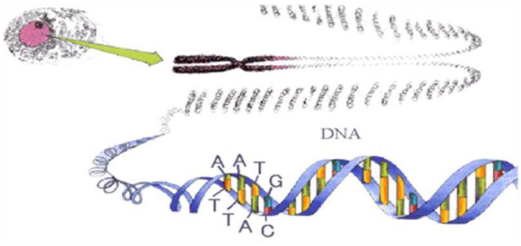
C. Forensic Identification



DNA Structure

The National Research Institute of Police Science (NRIPS) and the Criminal Investigation Laboratories (CILs) of the MPD and the prefectural police conduct close analyses and examinations of evidence. DNA profiling is conducted at all CILs in order to identify individuals at a high degree of accuracy by examining minute specimens left at the crime scenes.

NRIPS also established the Training Institute of Forensic Science to provide training for CIL specialists to improve and standardize the quality of examination techniques.


Collecting DNA samples


DNA profiling

3. National Research Institute of Police Science

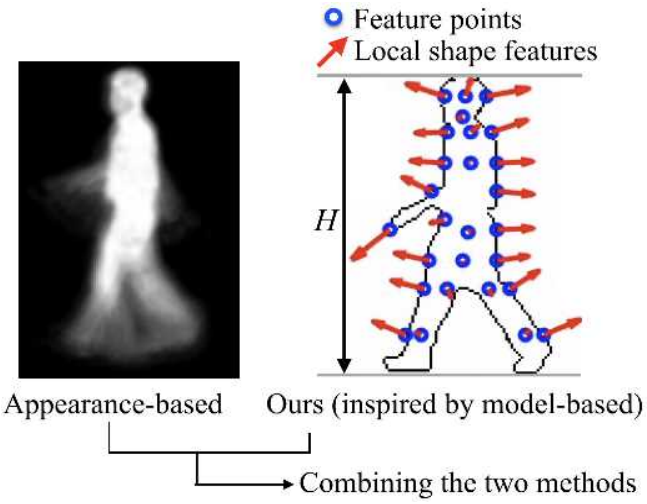
NRIPS is a comprehensive research institution to promote the development of science in support of police activities.
The institute has three major missions: research and development; examination and analysis; and technical guidance. Many research and development projects in various fields are conducted, considering the needs of the prefectural police.
Following are recent major research projects:

A. Development of mRNA-based body fluid identification

Quantitative PCR instrument

Body fluid identification of biological forensic samples provides important probative evidence for criminal investigations. However, some conventional procedures should be improved because of their insufficient specificity and detectability. For example, the results of α-amylase activity-based presumptive tests for saliva should be interpreted carefully because the α-amylase activities are also found in other body fluids. NRIPS therefore has investigated the applicability of mRNAs which are characteristically and highly expressed in the targeted body fluids, and successfully developed a more specific quantitative RT-PCR procedure for discriminating saliva from other body fluids.

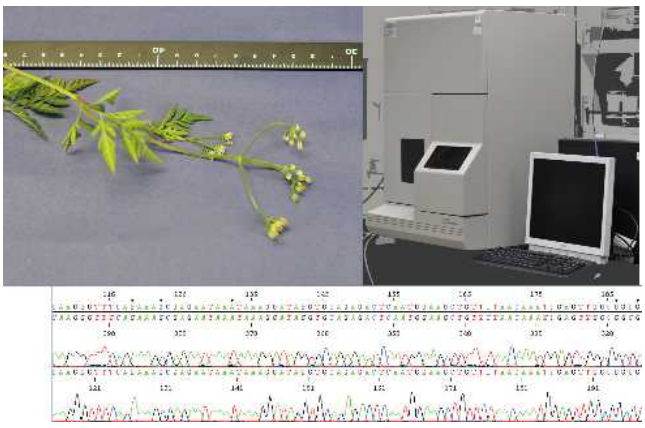
B. Human Identification from Gait Footage: Utilizing Two Different Methods



Currently, human identification from gait footage is used for forensic purposes using the Gait Verification Software developed by Osaka University. This appearance-based method is very useful when the footage is under certain conditions to yield adequate features of the figural data. However, the identification rate drops when the conditions are not sufficient. Major difficulties of the approach are the low-frame rate and clothing variations.

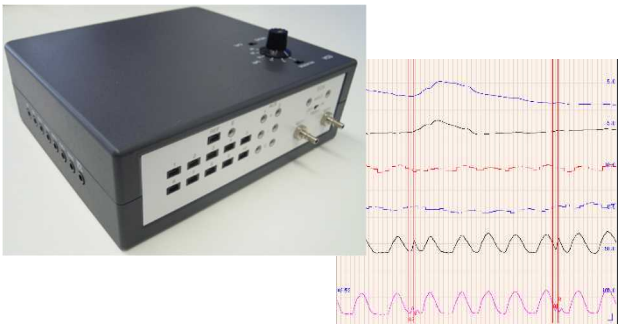
Focusing also on the individuality of dynamics in addition to the figures, NRIPS has developed a novel gait analysis method inspired by the model-based method, which is found to yield more reliable identification results in some cases of low-frame rate or clothing variations. NRIPS plans to combine these two methods to overcome the current difficulties and obtain more reliable analysis methods.

C. Application of DNA analysis to trace botanical evidence



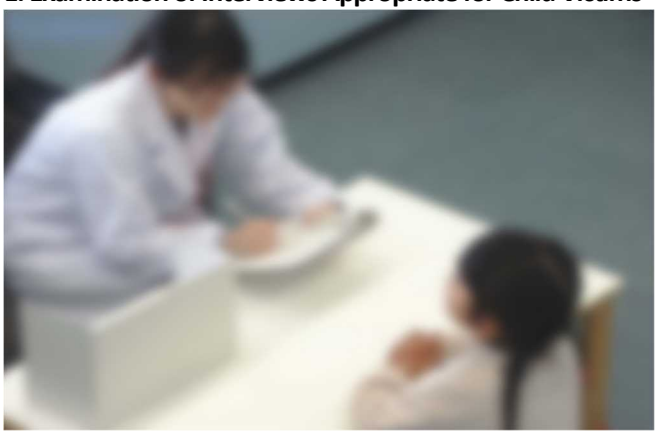
Small plant fragments are often found as trace evidence, but their characteristic morphologies could be lost or inadequate for forensic discrimination by observation or description. Recent technical advances, however, have enabled DNA analyses of botanical fragments. For example, it has been discovered that sequences of particular loci of chloroplast DNA are identical among the same plant species, and such DNA sequences are easily obtainable from a public database. DNA analysis has already been adopted for forensic analyses of practical samples in the NRIPS laboratory. Furthermore, NRIPS is developing methods to analyze wider types of forensic samples such as aged samples, cooked materials and mixtures of plant fragments.

D. Analysis of physiological activities during polygraph examinations



Polygraph examinations are widely used to detect crime-relevant information. It involves presentation of questions related to a crime embedded in similar, but unrelated information while recording several autonomic physiological activities. Whereas a person who knows nothing of the crime non-systematically responds to all questions, a person who does know of it differently responds to crime related questions. In addition, research by the NRIPS found that physiological reactivities in persons who know of a detail of a crime which they are being questioned about tends to be high up until the end of questioning related to the crime but drops thereafter. This finding is utilized for analyses of physiological activities.

E. Examination of Interviews Appropriate for Child Victims



It is important to conduct developmentally sensitive interviews for child victims in a legal context based on the stage of their cognitive and social development, in order to address their vulnerability during police interviews. We have conducted a series of experiments with typical child participants as well as examining the result of actual interviews with child victims to investigate which interviewing techniques re appropriate for eliciting accurate information from children. Further, we have examined the relationships between children' suggestibility and their cognitive and social characteristics (such as executive functions and self-assertiveness). We apply these findings to train police officers who interview child victims.

F. Analysis of Event Data Recorders

An Event Data Recorder (EDR) is a system to record information about motor vehicles and their occupants for a brief period of time before, during and after crash incidents.

Characteristics and accuracy of the EDR were evaluated against various crash test data. Therefore, the EDR of real accidents can be analyzed using the accumulated study results. Moreover, the EDR analysis method of vehicles with Advanced Driver Assistance System (ADAS) is being developed, which could contribute to accident analysis of self-driving vehicles.