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The National DNA Data Bank of Canada

Canada

A National Police Service

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The Helix and Maple Leaf Design is a recognized symbol for quality and excellence in forensic DNA analysis developed as part of the innovation of the National DNA Data Bank. The National DNA Data Bank is a branch of the Forensic Laboratory Services which is part of the National Police Services, Royal Canadian Mounted Police. The Helix and Maple Leaf Design is an Official Trademark under the Trademark Act.

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Message from the Commissioner of the Royal Canadian Mounted Police

It gives me great pleasure to present the second Annual Report for Canada's National DNA Data Bank (NDDB). This year, the Data Bank has solidified its international reputation as an exceptional mix of technology and talent. Through innovation, research and development, the NDDB provides timely, high quality services to partners and clients across Canada and more recently through Interpol, around the world. Law enforcement officers in every region of the country are taking advantage of the integration of science and police work to focus investigations, identify and apprehend offenders more quickly, and to eliminate suspects while protecting the innocent.

In last year's report, we noted that Data Bank staff using leading edge technology had generated 25 hits – linking DNA profiles to crime scenes or to convicted offenders. In many of these cases, the NDDB results played a significant role in securing convictions. Just as important, the Data Bank was instrumental in clearing innocent persons through the application of forensic science.

Commissioner G. Zaccardelli
Royal Canadian Mounted Police

Remarkably, the total number of hits in 2001-2002 has increased almost ten-fold, to 236. The science of forensic DNA, combined with the specialized expertise of Data Bank staff and their highly automated systems, is helping to solve these difficult cases, many of which involve serious offences like homicide, sexual assault and armed robbery.

For Canadians, it means safer streets and safer communities. For police and the courts, it means saving considerable time and money on investigations and bringing stronger cases to trial. It means the Data Bank is working for all of us in providing timely, reliable service to police agencies in every part of the country and, eventually, around the world.

Following a court order, any Canadian police officer with proper training can use a standard easy-to-use collection kit to submit a biological sample from a convicted offender for DNA profiling to the Data Bank and have it cross-referenced against the thousands of profiles already on the system. It's a tool that can mean the difference between convicting a serious offender or having to drop a case for lack of evidence.

A total of 236 hits is an amazing achievement, one that is shared by the Data Bank's many partners, including regional laboratories across Canada, police agencies, the legal and justice community, the Solicitor General of Canada, the Department of Justice and our international colleagues through Interpol and the FBI. It reinforces the Data Bank's key role in providing National Police Services which are administered by the Royal Canadian Mounted Police for the benefit of the entire Canadian law enforcement community.

Even better, we fully expect these numbers to continue to grow as more and more profiles are entered into the two Data Bank indices: the Crime Scene Index and the Convicted Offender Index. The law enforcement and justice communities are experiencing first hand the benefits of DNA profiling. They understand that when more samples are loaded into the Data Bank, there is a better chance of generating a hit with crime scene evidence or with offenders who have already been convicted.

This year also marks another important milestone: the first case where DNA crime scene information was shared internationally, and helped to link several serious cases together. Canada's National DNA Data Bank will continue to work closely with police partners around the world through an International Agreement with Interpol that allows for the sharing of DNA information, while protecting the privacy and security of the individuals involved.

Although the National DNA Data Bank is only two years old, it has already made its mark and is widely recognized for its innovation and research. More than that, the NDDB is demonstrating strong leadership, not only in the field of forensic DNA science, but also through its steadfast commitment to the integration of science and police work.

Building on early success, I'm very excited about the contribution the Data Bank will make over the coming weeks, months and years. A ten-fold increase in the number of hits from one year to the next is truly remarkable. The results will continue to improve as Data Bank staff develop and apply new knowledge, products, processes and services.

All Canadian police agencies, regardless of size, have equal access to the remarkable power of the National DNA Data Bank. Results from the NDDB are helping front line officers build solid cases where other leads have gone cold, while playing a vital role in protecting the innocent. That is comforting news to all Canadians. Moreover, as we continue to work more closely with partners in other parts of the world, sharing our knowledge and expertise, the benefits of this leading-edge science are being felt well beyond our borders.

Message from the Chief, National Police Services

I am delighted to have the opportunity to comment on the recent activities of the National DNA Data Bank. This report reflects the practical application of our vision in National Police Services to provide an integrated and invigorated program. This document clearly demonstrates the critical role the NDDB plays in its service to the police community. Chronicled in this report is the overwhelming success of the National DNA Data Bank, as can be seen in the increase in the number of cases, over the past year, where crimes were linked to offenders.

Assistant Commissioner
Rod Smith
Acting Chief, National Police Services

National Police Services is proud to be a champion of integrated policing as a fundamental and essential way of doing business effectively. Our goals of focusing on accountability, performance measurement and better reporting methodology are demonstrated through the excellent work of the NDDB. The RCMP's strategic objective of "safe homes and safe communities" is being furthered through this "cutting edge" technology.

As an important component of National Police Services, the National DNA Data Bank provides indispensable services to the police community and continues to be a model of forensic scientific achievement.

BACKGROUND

DNA is the fundamental building block for your entire genetic makeup. With the exception of identical twins, each person's DNA is unique. Highly discriminating, it is a powerful tool for identifying individuals – far more powerful than fingerprints.

Using modern technology, your DNA can be extracted from a small biological sample, such as a few drops of blood, the root of one of your hairs, or by swabbing the inside of your mouth. This sample can be analyzed, creating a DNA profile that can be used to identify you. That profile, in turn, can be compared to an **unknown** DNA profile drawn from a **different** biological sample. If the profiles match, the two samples come from the same person (or identical twins). If the profiles don't match, the samples come from different people.

The value of DNA to police investigations is enormous. Biological samples collected from a crime scene can either link a suspect to that scene, or rule the suspect out. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country, or halfway around the world.

HIGHLIGHTS FROM 2001-02

Although the National DNA Data Bank is only two years old, it is playing a pivotal role in supporting the law enforcement and criminal justice communities across Canada.

Compared to its first year of operation, the total number of hits in 2001-02 increased almost ten-fold, to 236. An offender hit occurs when a biological sample from a crime scene is sent to the Data Bank and the resulting DNA profile matches that of an individual included in the Data Bank's Convicted Offender Index. A forensic hit occurs when a crime scene DNA profile is sent to the Crime Scene Index of the Data Bank and matches that from at least one other crime scene included in the Data Bank's Crime Scene Index.

In 2001-02, more than 21,800 DNA samples from convicted offenders were processed and added to the National DNA Data Bank, along with more than 5,100 profiles from crime scenes. Sample totals for 2002-03 are expected to be even higher. The Data Bank is receiving only a fraction of the expected convicted offender samples that are eligible for processing under the legislation. Less than 50 per cent of primary designated offence samples and an even smaller proportion of the secondary designated offence samples are being collected and forwarded to the NDDB.

This year also marks another important milestone: the first case where DNA crime scene information was shared internationally through an agreement with Interpol, and helped to link several serious cases together.

The Data Bank employed 25 full-time staff in 2001-02, with a total operating budget of almost $2.9 million. Additional staff may be hired in 2002-03 to handle the anticipated increase in convicted offender samples received by the NDDB.

PRIORITIES FOR 2002-03

Education is a key priority. Together with legal, government and police partners, the message is getting out that the NDDB is fully operational and capable of handling tens of thousands of samples a year. The Data Bank's success depends on it: the more samples received, the greater the number of matches being made in the Convicted Offender Index and the Crime Scene Index.

WHAT IS DNA?

Deoxyribonucleic acid (DNA) is a long, double-stranded molecule that looks like a twisted rope ladder or double helix.

Sometimes referred to as the blueprint of life, DNA is the fundamental building block for your entire genetic makeup. When sperm and egg unite, equal amounts of DNA from your mother and father come together. DNA is found in virtually every tissue in the human body. The DNA in your blood is the same as the DNA in your skin cells, saliva, and the roots of your hair. Highly discriminating, DNA is a powerful tool for identifying individuals. With the exception of identical twins, each person's DNA is unique to them. Only a very small amount of blood or semen is required to identify an individual.

Using modern technology, your DNA can be extracted from a small biological sample, such as a few drops of blood. This sample can be analyzed, creating a DNA profile that can be used to identify you. A DNA profile, drawn from a known biological sample, can be compared to an **unknown** DNA profile drawn from a **different** biological sample. If the profiles match, the two samples come from the same person (or identical twins). If the profiles don't match, the samples come from different people.

The value of DNA to police investigations is enormous. Biological samples collected from a crime scene can either link a suspect to the scene, or rule the suspect out as the donor of the DNA. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country, or halfway around the world. It can also identify a victim through DNA submitted by close relatives.

The DNA molecule is very stable. This means that usable DNA can often be found on evidence that is decades old. The stability of the molecule, combined with the discriminating features of each individual's DNA and the accuracy of current DNA analysis techniques, makes DNA evidence an extremely reliable forensic tool.

DNA AND THE COURTS

In 1983, a young woman was found murdered and sexually assaulted in a small British town. In spite of a thorough police investigation, the case could not be solved. Three years later, another young woman was murdered and sexually assaulted in a nearby community.

A suspect was eventually identified in the first case. Police sent samples of forensic evidence from both crime scenes and a sample of the suspect's blood to Dr. Alec Jeffreys, a prominent British scientist conducting research on DNA.

Dr. Jeffreys was able to give the police two critical pieces of information:

1. DNA evidence collected at both crime scenes came from the same person (thereby linking the crime scenes together and identifying a serial offender); and,
2. The suspect's DNA did not match the sample from the crime scenes (exonerating the original suspect, who had actually signed a confession).

Blood samples were later taken from more than 4,500 men in surrounding communities and a match was eventually found. One man was convicted of both violent crimes.

CREATING A NATIONAL DNA DATA BANK

In 1989, DNA analysis was first used by the RCMP in an investigation in which a suspect denied any involvement in a sexual assault, but the victim identified him as the attacker. DNA analysis later confirmed the victim's story. When confronted with the DNA test results in court, the suspect changed his plea to guilty.

Although the RCMP started using DNA analysis in 1989 there was, at this early stage, no central coordination at the national level that could help police take full advantage of the unfolding advances in DNA technology. In order for this new tool to be used to its full potential, there was a need to coordinate DNA profiling data from investigations across the country. With support from all levels of government, the

general public and police agencies throughout Canada, decisive steps were taken to create the National DNA Data Bank.

Considerable consultation was carried out and included a wide range of topics. In 1996, for example, the Department of the Solicitor General and the Department of Justice undertook consultations across Canada regarding the establishment of a national DNA data bank. The following groups participated in these consultations:

- Provinces and territories
- Police associations
- Privacy officials
- Legal associations
- Victim advocates
- Women's groups
- Correctional institutions
- Forensic and genetic organizations

Confirming the Government of Canada's commitment to combat crime, especially violent crime, Bill C-3, the *DNA Identification Act* (S.C. 1998 c.37) received Royal Assent on December 10, 1998, and was proclaimed in force on June 30th, 2000.

That same year, Parliament enacted Bill S-10, *An Act to amend the National Defence Act*, the *DNA Identification Act*, and the *Criminal Code* (S.C. 2000, c.10).

The RCMP committed to build a national DNA data bank and to make it operational within 18 months from Bill C-3 receiving Royal Assent and carried through on the commitment. The Data Bank is part of National Police Services, administered by the Royal Canadian Mounted Police for the benefit of the entire Canadian law enforcement community.

The budget for the design and construction project was $10.9 million including implementation, operations, maintenance and capital costs. The project was completed on time and approximately one per cent under budget.

The Data Bank currently employs 25 people and operated over the last fiscal year on a budget of approximately $2.9 million. When the NDDB reaches full capacity – 30,000 convicted offender samples per year – the number of staff will increase to 33 and the annual budget closer to $5 million.

THE NATIONAL DNA DATA BANK (NDDB)

The NDDB is located at RCMP Headquarters in Ottawa and is a branch of the Forensic Laboratory Services. It contains the Convicted Offender Index and the Crime Scene Index. These represent two different sets of information in which DNA profiles are developed and compared.

THE ROLE OF THE NATIONAL DNA DATA BANK

The National DNA Data Bank assists law enforcement agencies in solving crimes by:

- Linking crimes together where there are no suspects;
- Helping to identify suspects;
- Eliminating suspects where there is no match between crime scene DNA and a DNA profile in the Data Bank; and,
- Determining whether a serial offender is involved.

The National DNA Data Bank improves the administration of justice by ensuring that those who commit serious crimes are identified more quickly across all police jurisdictions in Canada while removing innocent people from suspicion.

As of May 14, 2002, more than 21,800 DNA samples from convicted offenders have been processed and added to the National DNA Data Bank, along with more than 5,100 profiles from crime scenes. Thousands of police officers across Canada have been trained to collect DNA samples, which are then forwarded to the National DNA Data Bank for analysis.

CUTTING EDGE TECHNOLOGY

Canada's National DNA Data Bank relies heavily on robotic technology to dramatically speed up the processing and analysis of DNA samples. The robotics, combined with a world-class inventory and sample tracking system, allows National DNA Data Bank personnel to process more samples in less time and at a significantly lower cost than other facilities around the world. The specialized sample tracking and control system used by the NDDB also protects the privacy of the individual and ensures security of the data.

PROTECTING PRIVACY

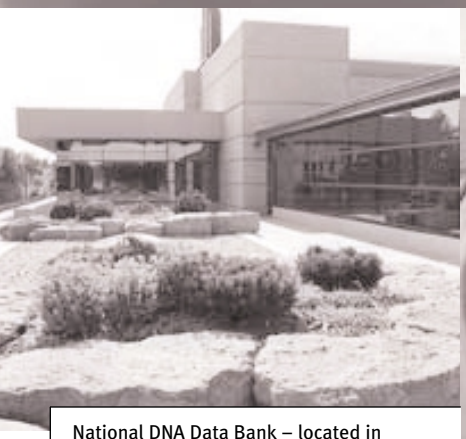
Every effort has been made to balance a suspect's right to privacy with the need for police officers to collect evidence.

Consistent with the *DNA Identification Act*, the RCMP has imposed strict procedures governing the handling of DNA profiles and biological samples to ensure that privacy interests are protected. Information collected by the Data Bank is used strictly for law enforcement purposes. A National DNA Data Bank Advisory Committee has also been established to advise the Commissioner of the RCMP on matters relating to the establishment and operation of the Data Bank. These matters are consistent with the requirements of the *Act* regarding privacy, legal, ethical and human rights issues.

Samples

Donor identity validation
of DNA collection kit

Preparing the DNA sequencers for analysis



National DNA Data Bank – located in
the Forensic Laboratory Services, Ottawa
building and is part of the National Police
Services.

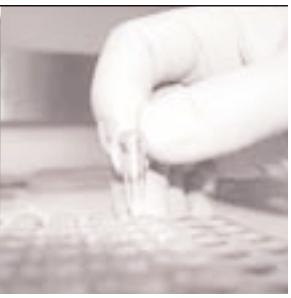
DNA processing using
a robot workstation

DNA profile developed
from biological samples

DNA

The **Convicted Offender Index (COI)** is the electronic DNA profile database that has been developed from biological samples collected from: Offenders convicted of designated primary and secondary offences (see Appendices A and B) identified in section 487.04 of Canada's *Criminal Code*, and Retroactive Offenders who fall within categories identified in section 487.055 of the *Criminal Code*.

The **Crime Scene Index (CSI)** is a separate electronic database composed of DNA profiles obtained from crime scene investigations of the same designated offences.



Thousands of police officers across Canada have been trained to collect DNA samples from convicted offenders that are then forwarded to the National DNA Data Bank for analysis.

DNA samples can be collected in three ways:

1. **Blood.** The sample is obtained by pricking the fingertip with a sterile lancet and collecting bloodstains on a specially prepared sample card.
2. **Buccal**. The sample is obtained by rubbing the inside of the mouth with a foam applicator to obtain skin cells that are then transferred to the sample card.
3. **Hair.** The sample is obtained by pulling 6-8 hairs with the root sheath attached and placing the hairs on a special sample card.

The Convicted Offender biological samples (blood, buccal or hair) are collected across Canada and are processed into DNA profiles at the National DNA Data Bank.

The information is entered into "CODIS" (Combined DNA Index System), a software that stores and compares DNA profiles.

The Crime Scene Index samples are processed from biological evidence collected at crime scenes as forensic casework by the three public forensic laboratory systems in Canada: RCMP Forensic Laboratory Services (Vancouver, Edmonton, Regina, Winnipeg, Ottawa and Halifax); Laboratoire de sciences judiciaires et de médecine légale (Montreal, Quebec); and the Centre of Forensic Sciences (Toronto, Ontario).

The National DNA Data Bank retains an electronic index of the DNA profile data from the crime scene and basic information such as the date, location and a unique number identifier that allows information to be compared by the donor laboratory in the event of a future match. It is important to realize that both crime scene samples and convicted offender samples are identified simply by a unique number.

In fact, the process separates the donor identity of the convicted offender from the genetic information at the time the sample arrives at the Data Bank. A bar code number links the personal information to the DNA sample.

This link is protected information that is not accessible by Data Bank staff and is kept by the RCMP's Canadian Criminal Records Information Service (CCRIS).

The DNA profiles obtained from either convicted offender samples or crime scene samples are the result of 13 special tests that produce a DNA blueprint, unique to each individual.

Canadian law makes it very clear that the Data Bank profiles can only be used for law enforcement purposes. The regions of interest that Canadian forensic scientists use for profiling are considered anonymous pieces of DNA and, apart from gender, do not specify any medical, or physical information about the donor. The 13 core tests or "loci" chosen for forensic analysis in Canada are the same regions of genetic variation used throughout the United States and in many other countries using forensic DNA analysis.

FIGURE 1

CASES ASSISTED BY THE NDDB	
Murder	13
Sexual Assaults	58
Attempted Murder	11
Robbery	31
Break and Enter	94
Assault	12
Others	17
TOTAL	236

FIGURE 2

MATCH INVENTORY REPORT	
Offender Hits – Crime Scene to Offender	236
Forensic Hits – Crime Scene to Crime Scene	16
Offender Duplicate	286
Identical DNA profiles but different ID's (Identical twins)	9

Explanatory Notes

An **offender hit** occurs when a DNA profile developed from a biological sample from a crime scene is sent to the Data Bank and it matches that of an individual's DNA profile included in the Data Bank's Convicted Offender Index.

A **forensic hit** occurs when a crime scene DNA profile is sent to the Crime Scene Index of the Data Bank and matches that from at least one other crime scene included in the Data Bank's Crime Scene Index.

Offender duplicate refers to cases where two samples from the same person were submitted to the Data Bank.

Identical DNA profiles but different ID's (Identical twins) refers to the DNA profiles of nine sets of identical twins that are contained in the Data Bank's indices.

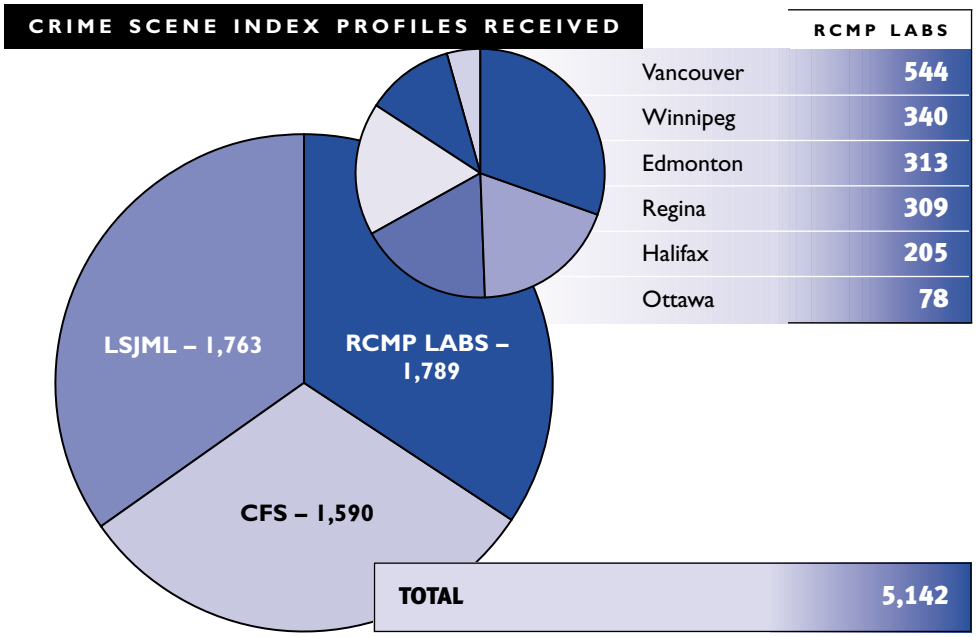
FIGURE 3

Explanatory Notes

Convicted Offender Profile: A profile from an offender who was convicted of a designated offence (e.g. homicide, sexual assault, assault with a weapon, etc.). For a complete list of primary offences, see Appendix A; for secondary offences, see Appendix B.

Crime Scene Profile: A profile derived from a biological substance left at the scene of a crime.

FIGURE 4



Explanatory Notes

LSJML is the Laboratoire de sciences judiciaires et de médecine légale in Montreal.

CFS is the Centre of Forensic Sciences in Toronto.

RCMP Forensic Laboratory Services includes laboratories located in Vancouver, Edmonton, Regina, Winnipeg, Ottawa and Halifax.

FIGURE 5

CONVICTED OFFENDER SAMPLES RECEIVED					
Retroactive		1,364	Primary	57%	12,958
Retrospective		11,220	Secondary	42%	9,592
Prospective		10,093	Non-designated		127
TOTAL		22,677			
Alberta		1,859	Nunavut		91
British Columbia	9%	2,074	Ontario	52%	11,810
Manitoba		1,380	Prince Edward Island		27
New Brunswick		315	Québec	14%	3,164
Newfoundland		369	Saskatchewan		1,045
Nova Scotia		318	Yukon		49
North West Territories		176			

Explanatory Notes

The **Convicted Offender Index** is a post-conviction database composed of three categories of samples.

Retroactive: A sample taken from an offender who was found guilty of a designated *Criminal Code* offence before June 30th, 2000 and who 1) had been declared a dangerous offender, 2) was convicted of more than one murder committed at different times, or 3) was convicted of more than one sexual offence, and on June 30th, 2000 was serving a sentence of at least two years for one or more of those offences. Approximately 2,000 offenders were identified on the Retroactive offenders list. All of these offenders have been processed and their certified criminal history forwarded to provincial/territorial Attorneys General. A total of 1,378 of these files have been concluded, with the remainder being prepared by the Attorneys General for court applications. It is anticipated that all files will be concluded by the fall of 2002.

Retrospective: A sample taken from an offender who committed a designated *Criminal Code* offence before June 30th, 2000 and was convicted after that date.

Prospective: A sample taken from an offender who committed and was convicted of a designated offence after June 30th, 2000.

Primary Offences (see Appendix A)

Secondary Offences (see Appendix B)

Non-designated: A sample taken from an offender who (1) was convicted of an offence that is not a primary or a secondary designated offence, or (2) does not belong to one of the categories of offenders set out in the retroactive scheme.

FIGURE 6

TYPE OF DATA BANK SAMPLES RECEIVED FROM CONVICTED OFFENDERS		
Blood	22,076	97.3%
Buccal	560	2.5%
Hair	41	0.2%
TOTAL	22,677	

In some instances, samples had to be taken a second time, pursuant to subsection 487.091(1) of the *Criminal Code*, which provides for an application for resampling where a DNA profile cannot be derived from the original sample. The Data Bank has received 43 samples that were taken under this provision.

FIGURE 7

SAMPLE REJECTIONS		
Non-designated offences		127
Biological samples inadequate		56
Wrong Kits		45
No orders (consent)		3
Others		9
REJECTED SAMPLES	1.1%	240

Note: These figures do not include sample kits submitted without fingerprints. Typically, if an affidavit from the collection officer is provided at a later date, continuity is established and the samples can be accepted. Since June 30th 2000, the Data Bank received 223 sample kits that did not contain fingerprint information on the sample collection card or the fingerprint identification form.

In some instances, samples had to be taken a second time using the provision provided by the *DNA identification Act* using form 5.09.

Approximately one per cent of samples cannot be accepted by the National DNA Data Bank for the reasons listed above.

FIGURE 8

BREAKDOWN OF CONVICTED OFFENDER SAMPLES RECEIVED	
Young Offenders	3,411
Adult Offenders	19,259
Military Offenders	7
TOTAL	22,677

FIGURE 9

CONVICTED OFFENDER INDEX BREAKDOWN OF OFFENCES		
Homicides	550	2.1%
Sexual Assaults	5,350	20.1%
Break & Enter / Robbery	6,154	23.2%
Assaults	12,546	47.3%
Other	1,910	7.5%

Explanatory Notes

The **Homicides** category includes manslaughter.

The **Sexual Assaults** category includes rape, sexual intercourse with female under 14 and between 14 and 16, sexual intercourse with feeble-minded, sexual interference, invitation to sexual touching, sexual exploitation, incest, bestiality in the presence of or by a child, child pornography, indecent acts, offence in relation to juvenile prostitution, sexual assault with weapon, and aggravated sexual assault.

The **Break & Enter/Robbery** category is limited to the two offences.

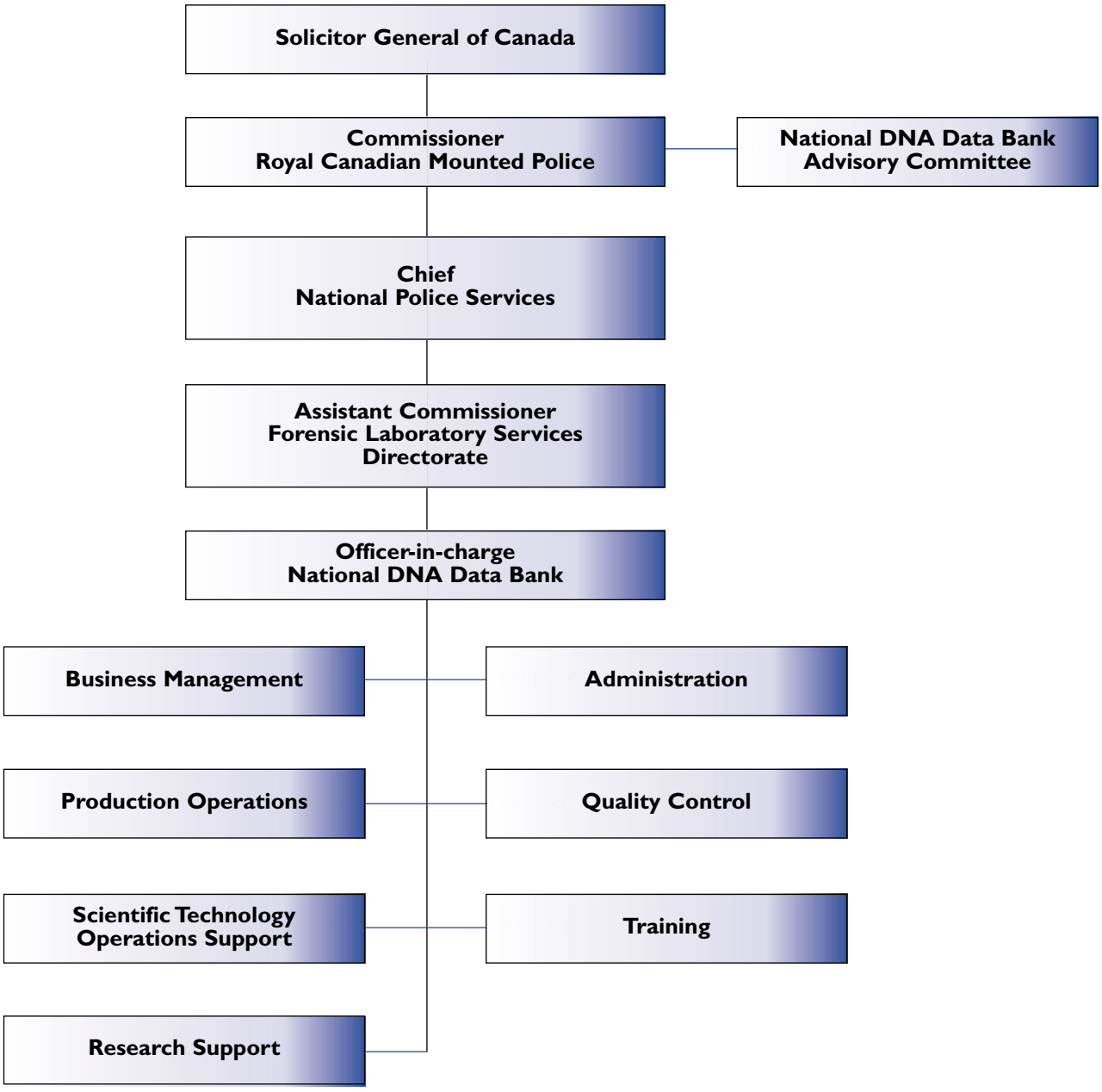
The **Assaults** category includes assault with a weapon or causing bodily harm, aggravated assault, and assaulting a peace officer.

The **Other** category includes using explosives, causing death by criminal negligence, causing bodily harm by criminal negligence, causing bodily harm with intent, dangerous operation causing bodily harm, dangerous operation causing death, failure to stop at scene of accident, impaired driving causing bodily harm, impaired driving causing death, unlawfully causing bodily harm, kidnapping, hostage taking, mischief causing danger to life, arson - disregard to human life, setting fire to other substance, arson - own property.

FIGURE 10

SAMPLES / PROFILES REMOVED FROM THE DATA BANK	
Convictions quashed on appeal	3
Authorization quashed	1
Judge ordered destruction of the sample on a conviction with a suspended sentence	1

Samples and their DNA profiles that were removed from the NDDB for the reasons listed above.



Currently, the National DNA Data Bank employs 25 full-time personnel. At full capacity, the NDDB would require 33 employees.

Joining Forces with Other Countries

The borderless nature of crime has forced law enforcement agencies to look beyond their own borders and work more cooperatively with partners around the world to be truly intelligence – led in a global alliance against common threats to public safety and national security. This international reality applies to forensic DNA as well. Some crimes are committed in one country by individuals whose DNA profiles may be stored in data banks elsewhere. Recognizing this reality, Canada's National DNA Data Bank has worked with the Office of the Solicitor General of Canada and the Department of Justice to develop formal agreements to facilitate the international exchange of information.

This year, the first such agreement has been established with Interpol, offering investigators in 178 different countries the opportunity to share information developed with this powerful new crime-solving tool. Already, the partnership has proven its value. A DNA profile in the Crime Scene Index at the National DNA Data Bank made a hit and linked a series of sexual assaults committed in the United States. The perpetrator's DNA profile was provided through Interpol by the FBI National CODIS program.

Financial Statement

EXPENDITURES – 2001/02 FISCAL YEAR

COST DRIVER	EXPENDITURES *($ thousands)*
Personnel	1,166
Transport and communications	108
Information	10
Development and infrastructure support	481
Rentals	4
Repair and maintenance	78
Utilities, material and supplies	536
Capital and minor equipment purchases	507
Miscellaneous	1
TOTALS	2,892

* The original budget forecast of $5.1 million was based on the NDDB receiving a minimum of 30,000 convicted offender samples per year.

The National DNA Data Bank Advisory Committee was created pursuant to the *DNA Data Bank Advisory Committee* Regulations in 2000. The Solicitor General of Canada created the Committee to advise the Commissioner of the RCMP on all matters related to the establishment and operation of the Data Bank. The requirements of the *Act* regarding privacy, legal, ethical and human rights are balanced with the latest scientific developments in the application of DNA identification for law enforcement purposes.

Overall, the Committee finds the operations of the Data Bank to be highly effective and, more specifically, applauds the safeguards established to protect the privacy and security of convicted offenders' DNA.

The distinguished members of the Committee have expertise in policing, privacy, molecular biological sciences, genetics, medical ethics and the law. Considered fundamental to the effective scientific and efficient operation of the Data Bank, the Committee operates independently of the government and reports annually to the Commissioner of the RCMP.

Over the past year, the Committee members have tackled some fundamental issues: funding of the Data Bank, review and consultation regarding the receipt of non-designated offences, population of both crime scene and convicted offender indices, and the promotion of legal and judicial education pertaining to the *Act*.

Members of the National DNA Data Bank Advisory Committee consulting with government partners.

More information on the Advisory Committee and a copy of their annual report may be obtained at: http://www.rcmp-grc.gc.ca/dna_ac/index_e.htm

Our second year of operation brought many successes, but also challenged us in ways we had never anticipated.

NEW REALITIES AND NEW LEGISLATION

After the events of September 11, the world witnessed a level of threat to safety and security that had never been experienced before. The Government of Canada responded, in part, with new legislation, the *Anti-Terrorism Act*, which added 18 primary offences to the list of designated offences (i.e. offences for which DNA samples can be taken from offenders). The new list includes offences such as threats or violence, hijacking, and participation in the activity of a terrorist group.

There are now 38 primary offences and 21 secondary offences (see Appendices A and B) for which judges can require an offender to submit a biological sample (blood, mouth swab or hair sample) for profiling at the National DNA Data Bank.

Dr. Ron Fourney
Officer-in-Charge
National DNA Data Bank of Canada

MAKING A DIFFERENCE

There is no doubt that the Data Bank is making a difference in the daily investigations of some of Canada's most difficult and serious criminal cases. Since its opening, the Data Bank has made 236 matches between crime scene and convicted offender samples and 16 crime scene to crime scene matches, which are still awaiting the identity of a perpetrator.

INTERNATIONAL TRENDS

Looking into the future, international trends suggest that criminal investigative data banks are contributing to intelligence-based policing and linking less serious crimes to the most serious offences. For example, it has been noted at the Florida Department of Law Enforcement Convicted Offender Data Bank that DNA profiles developed from burglary investigations led to matches in 12 percent of all sexual assaults and 28 percent of homicides.

The issue facing the future use of Canada's National DNA Data Bank will most likely be the expanded investigation of less serious offences to assist in solving the most serious crimes and, potentially, the older and more challenging cases. Moreover, adding more DNA profiles to the Crime Scene Index will undoubtedly become the "silent witness" to many investigations, and will help police focus on suspects while eliminating individuals who were not involved in the crime.

THE NEED FOR MORE SAMPLES

What does this mean? Simply put, the more samples that go into the Data Bank, the better our chances of finding a match and helping to solve a crime. To date, the major risk factor impacting the effective operations of the National DNA Data Bank has been the low number of samples entering the system. Original consultations prior to the creation of the Data Bank estimated there were approximately 18,700 primary offences and more than 94,000 secondary offences per year that could be eligible for entry into the Convicted Offender Index of the Data Bank. Overall, the National DNA Data Bank is receiving only a fraction of the expected convicted offender samples that are eligible for processing under the legislation. Less than 50 percent of primary designated offence samples and an even smaller proportion of the secondary designated offence samples are being collected and forwarded to our facility in Ottawa.

The other major component of the Data Bank – the Crime Scene Index - did see a dramatic increase in the number of samples added this year. What's most encouraging about this is the fact that we can now predict that five per cent of the crime scene profiles entering the Data Bank will result in a positive match with the Convicted Offender Index. To put it more simply, for every 100 DNA samples taken from crime scenes, five of them will generate a "hit" with a known

offender, linking that individual to the crime scene. The value to the law enforcement community is very powerful indeed.

EDUCATION IS CRITICAL

Looking ahead to the coming year, education is a key priority. Together with our legal, government and police partners, we need to get the word out that the Data Bank is fully operational and capable of handling tens of thousands of samples a year. Our success depends on it: the more samples we receive, the more hits we get from the system.

Short-term priorities also include two new innovations:

1. A new automated approach for the potential DNA identification of victims of mass disasters; and
2. A more automated approach for DNA processing of more simplified operational casework such as evidence left at the scene of break and enter incidents.

A SUCCESSFUL PARTNERSHIP

In summary, the National DNA Data Bank and its many government, legal and police partners have worked cooperatively to enhance the safety of Canadians and the administration of justice. This has been successful because of the dedication of many individuals and the practical application of modern science and leading-edge technology.

Appendix A

LIST OF PRIMARY OFFENCES – CRIMINAL CODE

	OFFENCE	SECTION
1	Approaching, entering, etc., a prohibited place	6 SIA*
2	Threats or violence	(20)(1) SIA*
3	Harboring or concealing (Security of Information)	(21)(1) SIA*
4	Piratical acts	75
5	Hijacking	76
6	Endangering safety of aircraft or airport	77
7	Seizing control of ship or fixed platform	78.1
8	Using explosives	81(1)
9	Participation in activity of terrorist group	83.18
10	Facilitating terrorist activity	83.19
11	Commission of offence for terrorist group	83.2
12	Instructing to carry out activity for terrorist group	83.21
13	Instructing to carry out terrorist activity	83.22
14	Harboring or concealing (Terrorism)	83.23
15	Sexual interference	151
16	Invitation to sexual touching	152
17	Sexual exploitation	153
18	Incest	155
19	Offence in relation to juvenile prostitution	212(4)
20	Infanticide	233
21	Murder	235
22	Manslaughter	236
23	Causing bodily harm with intent	244
24	Assault with a weapon or causing bodily harm	267
25	Aggravated assault	268
26	Unlawfully causing bodily harm	269
27	Sexual assault	271
28	Sexual assault with a weapon, threats to a third party or causing bodily harm	272
29	Aggravated sexual assault	273
30	Kidnapping	279
31	Hostage taking	279.1
32	Attack on premises, residence or transport of internationally protected person	431
33	Attack on premises, accommodation or transport of United Nations or associated personnel	431.1
34	Explosive or other lethal device	431.2(2)

**SIA: Security of Information Act*

LIST OF PRIMARY OFFENCES – CRIMINAL CODE

	OFFENCE	SECTION
As they read from time to time before January 4, 1983:		
35	Rape	144
36	Sexual intercourse with female under fourteen and between fourteen and sixteen	146
37	Sexual intercourse with feeble-minded, etc.	148
As it read from time to time before January 1, 1988		
38	Sexual intercourse with step-daughter, etc.	153.1(a)

Appendix B

LIST OF SECONDARY OFFENCES – CRIMINAL CODE

	OFFENCE	SECTION
1	Bestiality in the presence of or by child	160(3)
2	Child pornography	163.1
3	Parent or guardian procuring sexual activity	170
4	Indecent acts	173
5	Causing death by criminal negligence	220
6	Causing bodily harm by criminal negligence	221
7	Dangerous operation causing bodily harm	249(3)
8	Dangerous operation causing death	249(4)
9	Failure to stop at scene of accident	252
10	Impaired driving causing bodily harm	255(2)
11	Impaired driving causing death	255(3)
12	Assault	266
13	Torture	269.1
14	Assaulting a peace officer	270(1) (a)
15	Robbery	344
16	Breaking and entering with intent. committing offence or breaking out	348(1)
17	Mischief that causes actual danger to life	430(2)
18	Arson – Disregard for human life	433
19	Arson- Own property	434.1
	As they read from time to time before July 1, 1990:	
20	Arson	433
21	Setting fire to other substance	434

i) REPEALED: section 75 (Piratical acts) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17, effective December 24, 2001 (SI/2002-16).

(ii) REPEALED: section 76 (Hijacking) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17, effective December 24, 2001 (SI/2002-16).

(iii) REPEALED: section 77 (Endangering safety of aircraft or airport) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17, effective December 24, 2001 (SI/2002-16).

(iv) REPEALED: section 78.1 (Seizing control of ship or fixed platform) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17, effective December 24, 2001 (SI/2002-16).

(v) REPEALED: paragraph 81(1)(a) or (b) (Using explosives) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17(4), effective December 24, 2001 (SI/2002-16).

(xx) REPEALED: section 279.1 (Hostage taking) has now been changed to a primary offence. S.C. 2001, c. 41, s. 17(4), effective December 24, 2001 (SI/2002-16).

Tremendous time, effort and funding has gone into the creation of Canada's National DNA Data Bank (NDDB). It is easy to sum up the costs, but how does one measure the value of the NDDB?

What follows are three actual cases where the NDDB has assisted police forces in Ontario, Quebec and New Brunswick. These are true stories, drawn up with input from the investigators, Forensic Laboratory personnel, Crown Attorneys and NDDB laboratory members. They cover the range of the serial break and enter thief to more serious crimes such as sexual assault and murder.

A Team Effort

CASE STUDY 1

THE CASE

The trail had gone cold on a vicious sexual assault.

A teenager in small-town Ontario was walking home one night in October of 1998. She was grabbed, dragged behind some trees and raped repeatedly. The attack was prolonged and violent.

The assault sparked terror in the region and police put six detectives on the case. Dozens of people were questioned and DNA samples were taken from more than twenty suspects. Not one of the suspects could be linked to the rape, however, and that only made the situation worse for community residents. With few leads to follow, the investigation slowly ground to a halt.

The detectives, refusing to give up the case, worked with the DNA specialist at Ontario's Centre of Forensic Sciences in Toronto, making sure that the DNA profile of the attacker had been entered into the Crime Scene Index of the National DNA Data Bank. This profile, along with 5000 other crime scene samples, would be routinely searched against all new cases as well as samples from convicted offenders.

THE COURTS

Almost three years after the attack, a man in another part of Ontario was convicted of assault causing bodily harm. As required under the *Criminal Code*, the trial judge ordered the offender to provide a biological sample (blood, hair or mouth swab) for the Data Bank's Convicted Offender Index.

THE NATIONAL DNA DATA BANK

The Data Bank operation is meticulous and highly automated. Once the biological samples are received, the donor identity is verified using fingerprints. All personal information is separated from the sample, which is then assigned a unique bar code number that is entered into a documentation control program called STaCS™ (Sample Tracking and Control System). From here on, the samples are anonymous and the privacy of the individual and resulting data is protected. STaCS™ combines scientific expertise with advanced robotics and information systems to process and track up to 96 samples at a time. The end result is a numeric DNA profile based on 13 key "loci" or test sites for each sample, similar to a human identity bar code.

Anonymous to the staff of the Data Bank, the DNA profile of the convicted man was then entered into a database system known as CODIS (Combined DNA Index System). CODIS is the software that stores and compares DNA profiles using a secure network and an encryption process for communication between laboratories. Developed by the FBI and the U.S. Department of Justice and provided to the Data Bank at no cost, CODIS provides a universally accepted standard for forensic laboratories to compare DNA results. The system links the six RCMP forensic laboratories and the two provincial forensic science laboratories in Ontario and Quebec. This standardized approach allows law enforcement to cross-reference forensic DNA evidence across Canada and around the world. Sixteen foreign countries have accepted CODIS as their common format for comparing DNA results.

THE MATCH

In the fall of 2001, CODIS compared the known DNA profile of the convicted criminal with the thousands of unknown profiles in the Crime Scene Index. There was a match or "hit" between the 1998 crime scene profile and the newly submitted Convicted Offender profile.

This critical breakthrough was immediately relayed to the regional police through the Centre of Forensic Sciences in Toronto, where the crime scene evidence had originally been processed.

The suspect was arrested four days later at his home. A warrant was issued allowing police to seize a second DNA sample from him and subsequent tests confirmed the match. It was the only piece of evidence linking the suspect to the attack.

"We had nothing connecting him," said the head of the investigation in a newspaper interview. "Without the DNA Data Bank, this predator would still be out there."

THE RESULT

The man pleaded guilty to the attack and was sentenced to five years in prison.

"It's gratifying to see the system working so well in cases like these," said Sylvain Lalonde, CODIS Coordinator at the National DNA Data Bank. "It makes the link for local investigators but it can also save thousands of dollars in investigation and court costs when a suspect pleads guilty on the strength of the DNA evidence against him."

MORE SUCCESS

The National DNA Data Bank, working closely with regional forensic laboratories, the police, and the courts, is heating up other investigations that have been cold for years. In Quebec, for example, a murder investigation dating back to 1995 was recently reopened.

A man convicted for an armed hold-up in Montreal was ordered by the court to provide a biological sample. His unique numeric DNA profile was generated by the National DNA Data Bank and entered into the Convicted Offender Index.

The verification with the Crime Scene Index from DNA evidence developed by the Laboratoire de sciences judiciaires et de médecine légale in Montreal, revealed a link to a seven-year-old, unsolved murder. The case is still under investigation but police in Laval are pursuing a fresh lead with the new partnership forged through DNA between the forensic laboratories and the National DNA Data Bank.

"These cases are an excellent example of the increasing importance of partnerships and the application of science and technology in modern law enforcement," notes Dr. Ron Fourney, Officer-in-Charge of the National DNA Data Bank. "To ensure the safety of Canadians and the best possible support to police and the courts, Canada must continue to be on the cutting edge of forensic science, including DNA technology."

Regardless of the crime scene, the population of the community, or the size of the police department, investigators are harnessing the crime-solving power of DNA. The Data Bank helps to ensure nation-wide access to this important forensic tool.

Following a Trail of Blood

CASE STUDY 2

THE CASE

It was the same M.O. (modus operandi): a series of robberies in Ottawa starting late in the autumn of 2000. At three of the crime scenes, the perpetrator left blood, probably from a cut as he smashed his way in.

THE POLICE

As soon as biological evidence is detected at a crime scene in Ottawa, the uniformed officers call in the forensic identification officers. They are trained to secure evidence that might carry DNA, preserving it "untainted" for analysis by specialized forensic laboratories.

"DNA evidence is becoming more important than fingerprints for crime detection," says Sgt. Don Sweet, the DNA Data Bank Coordinator with the Forensic Identification Section of the Ottawa Police Service. "We're seeing its impact practically every day."

THE NATIONAL DNA DATA BANK

The Ottawa Police Service regularly forwards DNA evidence via the Biology Sections of Canada's Forensic Laboratories to the Crime Scene Index of the National DNA Data Bank. The Index only receives DNA profiles from crime scene investigations of criminal offences designated in the DNA Identification Act. That includes serious crimes like murder and sexual assault as well as secondary crimes like break and enter.

At the Data Bank, DNA profiles are immediately cross-referenced with other crime scene evidence as well as with the parallel Convicted Offender Index. In the unsolved Ottawa case, the high-tech comparison of the three bloodstained break-ins showed a definite DNA link between the incidents.

"That was really important information," recalls Sgt. Sweet. "We knew we had a serial break and enter guy."

THE INNOVATIONS

Shortly after, Sgt. Sweet was called to take a DNA sample from a man who was convicted in the spring of 2001 for a separate break and enter. Consistent with the DNA Data Bank legislation, the judge in the case had issued an order for the sample to be taken and forwarded to the Data Bank's Convicted Offender Index.

"It's become a routine part of what I do," explains Sgt. Sweet. "We use the sample kits that the Data Bank provides us. They're simple and effective. We usually take blood. It gives the most dependable results."

The DNA sampling kits are a good example of the innovative approach to DNA collection, analysis and storage that characterizes Canada's National DNA Data Bank. "The kits are very well accepted by police officers as they are simple to use and help make their jobs easier in the long run," says Frances Porelle, DNA Training and Collections Manager at the Data Bank.

Facilities in other countries require enormous cold storage containers to maintain the quality of the DNA samples that are awaiting processing or being kept for future reference. The Canadian system uses specialized blotting paper that stabilizes the DNA and allows it to be stored at room temperature in secure cabinets.

"The specialized paper, known as FTA, is at the heart of our automated processing and analysis system," explains Dr. Chantal Frégeau-Aubin, Research Scientist at the National DNA Data Bank. "We tested a prototype collection kit and the paper's effectiveness when we used DNA analysis to help identify the 229 victims of the Swissair Flight 111 aircraft disaster off Peggy's Cove, Nova Scotia in 1998. It works extremely well in the

field, it's very cost effective, and speeds up our processing time dramatically."

The Data Bank relies heavily on robotic technology. The robotic workstations, along with a state-of-the-art inventory and sample tracking system known by the acronym STaCS™ (Sample Tracking and Control System), allows Data Bank staff to process many samples in a shorter time frame and at significantly lower cost compared to other facilities around the world. STaCS™ acts as an interface between machines and DNA analysts to form a seamless system. It provides unparalleled processing quality and sampling integrity that enables both the privacy and security of each DNA profile and sample.

"We are very pleased with the approach," says Kathy Bowen, Manager of DNA Analysis at the National DNA Data Bank. "This appears to be one good example of how highly trained individuals can get the most out of automation and technology."

THE MATCH

"In July of 2001," says Sgt. Sweet, reading from his extensive notes on the case, "we got word from the regional forensic laboratory that the DNA profile developed from the break and enters were from the same person, however the identity was still unknown. We then received word that the National DNA Data Bank had a hit with a convicted offender profile. They matched the sample of the offender with those three break and enters where we had found blood."

THE RESULTS

That information would eventually crack all three cases, but the police work was far from over. A DNA profile match by the National DNA Data Bank leads to a thorough process that is designed to both confirm evidence and to protect the rights of the suspect. The work on the original crime scene evidence must be reviewed and a warrant for a known sample from the suspect must be obtained. It is the DNA profile developed from the warrant sample that establishes the link between the suspect and crime scene and provides critical evidence at trial.

"DNA evidence is powerful. Using this advanced science, and teaming the scientists with the investigators, we can turn cold cases into convictions," says Sgt. Sweet. "We're very careful with quality control of our evidence gathering and our handling of biological materials. And it's having an effect. Judges are much less hesitant about issuing orders for DNA sampling. I think they see that we're using the technology responsibly."

The Officer-in-Charge of the Data Bank agrees.

THE NEED FOR MORE SAMPLES

"We know from court statistics that we should be processing about 30,000 offenders' samples per year in Canada. We're equipped to handle that many and more," says Dr. Ron Fourney. "But each sampling requires a judge's order. This was expected to be automatic in convictions for the more serious offences – the primary designated crimes, as they are called [see Appendix A] – but this currently is not happening. One of our immediate priorities is to raise awareness about the specific requirements of the Act and how the Data Bank plays a key role in the criminal justice system."

"There are real opportunities for us to licence these applications around the world," observes Dr. Fourney. "With this technology, we also export our way of doing criminal investigations. Canadian values of respect for privacy, rigorous quality control of evidence, and advanced data security are built into these systems. That might end up being the most significant contribution we make to crime detection in other countries."

Crime scene DNA: "Good as Gold"

CASE STUDY 3

THE CASE

It was nearly two o'clock in the morning when officers from the Codiac Regional RCMP responded to a 911 call from a home in the Moncton, New Brunswick area.

A teenage girl was waiting with her mother. She had been the victim of a sexual assault. While babysitting at a neighbour's house, she had fallen asleep in a basement bedroom. Just after midnight, she was awakened by a naked man holding her down on the bed. His face was covered by pantyhose pulled over his head.

The attacker raped the girl, then threatened to return and kill her if she told anyone about the incident. He fled the scene.

The victim told police that the adult male resident of the house returned about an hour later to find her crying in the living room of his home. He drove her immediately to her mother's place of work and together they called the RCMP.

"Right from the start our officers sensed something was wrong," says Constable Roland Cormier of the Major Crime Unit of the Codiac Regional RCMP. "The girl's story made sense, but the male resident's behaviour set off some alarm bells."

THE INVESTIGATION

The officers on the scene were surprised that a large Rottweiler dog in the residence had made no commotion during the break-in and assault. The police also felt the man was trying to eavesdrop on their conversations as they conducted their investigation at the crime scene.

The victim was taken to hospital for a medical examination. With the use of a sexual assault kit, semen was found and collected as evidence.

The next morning, uniformed officers made a neighbourhood check. A woman across the street said that while she was getting ready for bed at about 11:00 p.m., she saw the male resident of the house return home in his vehicle. She said he left again just before midnight.

"The man had claimed he was with friends all evening," recalls Constable Cormier. "The discrepancy between his account and that of the neighbour moved him to the top of our list of suspects."

The Codiac RCMP, like all police forces in Canada, has access to various national data banks including the Canadian Police Information Centre. A check on CPIC turned up a critical piece of information – the male resident was a convicted sex offender. A check on SPURS (Simplified Paperless Universal Reporting System) revealed that he had provided a blood sample in 2000 to the National DNA Data Bank.

"With that information," says Cormier, "we went into high gear."

THE REGIONAL FORENSIC LABORATORY

The first call went to Gary Verret of Biology Operations at the Halifax Regional Forensic Laboratory. He was able to quickly identify the crucial evidence, which he forwarded immediately to Ottawa for fast-tracked DNA profiling.

It was the Canada Day long weekend, but the case couldn't wait. Marc Lett of Biology Operations in Ottawa spent the holiday developing DNA profiles from the evidence.

"The results could not have been better," Lett recalls. "All the DNA tests combined to form a complete male DNA profile."

THE MATCH

The information was entered into the Data Bank's Crime Scene Index, which stores DNA profiles from thousands of crime scenes across Canada. By cross-referencing with the Convicted Offender Index, the Data Bank got a hit.

"The whole process only took about a week," says Constable Cormier, "then we got word through the lab in Halifax that there was a match with a guy who had served time in prison."

To protect individual privacy, the profiles in the National DNA Data Bank are stripped of any personal information and are identified only by a bar code number. To identify the suspect in the Codiac case, the Canadian Criminal Records Information Service of the RCMP matched the bar code number with a name. It was the male resident of the house where the assault took place.

"When I went to the Crown Prosecutor for an arrest warrant with the DNA match he said, 'This is as good as gold!'" remembers Cormier. A judge agreed and the warrant was issued.

Unfortunately, the prime suspect had already skipped town, leaving Moncton the day after the assault. Following up on a tip from his former wife, the suspect was picked up in Montreal at his sister's home. Constable Cormier flew to Quebec and confronted the man.

THE RESULTS

"He was very smooth, denying everything," recalls Cormier. "When we put the DNA link on the table, he continued to bluff but you could tell it got to him. He soon asked to call his sister and after she arrived in the interrogation room, he confessed. We had him."

Cormier maintains the DNA evidence, along with the involvement of the staff at Biology Operations and the National DNA Data Bank, played a critical role in solving the case. He estimates it saved him weeks of work just to make the case for an arrest warrant.

Just as important, it saved emotional stress on the victim.

"She was so traumatized by the assault that she denied her attacker could have been the male resident of the house," he says. "She remembered very few details that could identify the man. Without the DNA evidence and the quick link through the Halifax Lab and the National DNA Data Bank, we would have had to use a composite artist or maybe hypnosis to help her remember. But each time you force the victim to relive the incident, it creates a lot of pain. You just don't want to put anybody through that if you don't have to."

The suspect was eventually convicted on the basis of DNA evidence and was returned to prison.

THE FUTURE

The New Brunswick rape case is a good example of how Canadian laboratories, like the ones in Halifax and Ottawa, are working with the National DNA Data Bank to speed up and simplify local police investigations. It also points toward some areas of greater application of the Data Bank's powerful technology and capacity.

"Looking to the future," says the Officer in Charge of the National DNA Data Bank, Dr. Ron Fourney, "we're working on protocols and systems to provide faster results to assist local police forces along with other specialized forensic investigations. That could include using the same technology to assist in the potential identification of victims of mass disasters."

The technology and the potential are already there at Canada's National DNA Data Bank.