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Innovation in forensic medicine and science at the Victorian Institute of Forensic Medicine

The development of forensic medicine and science has undoubtedly been one of the great advances in criminal justice in the past 30 years. Its assistance in the search for the truth and hence improving the rule of law cannot be disputed. But that wasn't always so.

In the mid 1950s the College of Pathologists of Australia acknowledged that the standards of forensic pathology in Australia were not uniform and that in many

areas the medico-legal autopsy work was far from satisfactory. The College argued that a high standard of forensic pathology is fundamental to the administration of justice. It made recommendations to all Australian jurisdictions about the adequate training of specialists in the performance and documentation of medico-legal autopsies and the interpretation of autopsy results. The College recommended that a forensic pathologist have access to laboratory facilities in the specialised fields of histopathology, bacteriology, biochemistry and toxicology to enhance the quality and reliability of the medicolegal death investigation.

By the late 1960s it was also becoming increasingly apparent that the facilities at the old Melbourne City Mortuary in

Flinders Street were woefully inadequate for both staff and members of the public. As described by Professor Vernon Plueckhahn (Professor of Forensic Medicine, Monash University) in his history of the establishment of the Victorian Institute of Forensic Medicine:

"The foyer of the building was often filled with bereaved relatives, witnesses, lawyers and police waiting for an inquest to start. Odours from the mortuary usually permeated through the crowded foyer. Distressed relatives called to make formal identifications had to find their way through the crowd to the identification room. No dignity existed for either the living or the dead."

In 1968 a group of senior histopathologists made representations to the Victorian Government drawing attention to the appalling conditions of the City Mortuary and pressing for change. By the early 1970s the Victorian Government was seeking a suitable site for a new coronial complex, a challenging task given the likely local opposition to a mortuary being built close to residential and business areas.

The need for change building the future of forensic evidence for the courts

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histopathologists made representations to the Victorian Government drawing attention to the appalling conditions of the City Mortuary and pressing for change. By the early 1970s the Victorian Government was seeking a suitable site for a new coronial complex, a challenging task given the likely local opposition to a mortuary being built close to residential and business areas.

Government responds

In 1975 the then Attorney-General, the Hon. Vernon Wilcox OC established the Coroners Court Review Committee which met over a two-year period to inquire into whether the existing arrangements for the identification of deceased persons, post mortem examinations and forensic toxicology and analytic services, were satisfactory for present and future needs.

In its final report, submitted on 1 February 1977, the Committee recommended that all coroner's autopsies in Victoria be performed by, or under the supervision

"We wish to stress that conditions for the storage of bodies are a disgrace to the State of Victoria and that there is an urgent need for new facilities for the Coroners Court and mortuary."

of, an appropriately qualified pathologist who has access to ancillary services for toxicology, serology, histopathology, microbiology and radiology. However, the Committee recognised that there was a gross lack of qualified forensic pathologists and no current medical graduates undergoing training, a situation that was unlikely to change given the conditions of the City Mortuary. It made the recommendation that no specialist forensic pathologist should function in isolation from medical undergraduate and postgraduate teaching. The Committee drew attention to the sub-standard



The former City Mortuary facilities

facilities for toxicology testing that were "unhygienic and unsafe" and that there were unacceptable delays in the provision of toxicology results. Finally it highlighted the intolerable conditions for members of the public attending for an inquest or to identify a deceased person:

"We wish to stress that conditions for the storage of bodies are a disgrace to the State of Victoria and that there is an urgent need for new facilities for the Coroners Court and mortuary."



In 1978 the Victorian Government approved a site in West Melbourne for a new coronial complex. There were strong arguments made for the integration of police and coronial laboratory services and for them to be administered independently of the Coroner and

Victoria Police and staffed by civilian scientists, with all results being made available to all parties in a court action. This proposal was ultimately not supported, leading to the separation of police and coronial scientific laboratories. A change of government in 1982 saw the election of the Hon. John Cain as Premier, and the appointment of the Hon. Jim Kennan QC as Attorney-General in 1983.

During the early years of the Cain Government, the shortcomings in the standards of forensic science in Australia were played out in the notorious trial of Lindy Chamberlain, a case where both the law and forensic experts failed, and in failing, brought about a terrible injustice.



Azaria Chamberlain's matinee jacket

... the shortcomings in the standards of forensic science in Australia were played out in the notorious trial of Lindy Chamberlain, a case where both the law and forensic experts failed, and in failing, brought about a terrible injustice.

> Following the imprisonment of Lindy Chamberlain for the murder of her infant daughter Azaria, a small group of Australian scientists formed the Chamberlain Innocence Committee. Their work led to a number of findings that challenged the scientific evidence presented by the Crown during the trial. On 12 June 2012, almost 32 years after Azaria Chamberlain's death, a final inquest announced its finding that the cause of her death was the result of being taken and attacked by a dingo.

The Victorian Institute of Forensic Pathology is established to strengthen the credibility of forensic medicine and science

The trial of Lindy Chamberlain was vital to the creation of the Victorian Institute of Forensic Pathology (as it was first known). The defence counsel representing the Chamberlains at their trial was the Hon. John Phillips QC. He was so appalled by the state of forensic expert evidence at that time that he joined the campaign led by Professor Vernon Plueckhahn for an independent body capable of producing objective and reliable evidence for the criminal justice system. In 1983 the Attorney-General, the Hon. Jim Kennan, met with the Hon. John Phillips QC,

In 1984, at the request of the Attorney-General, an interim Council of the Victorian Institute of Forensic Pathology was established with the Hon. John Phillips **OC** as its Chair.

Professor Vernon Plueckhahn and Professor Graeme Schofield (Dean of Medicine, Monash University) to assure them of his support for the establishment of a new Coronial Services Centre comprising of coroners courts and the Victorian Institute of Forensic Pathology (VIFP). Graeme Schofield had enthusiastically embraced the idea of creating a Chair in Forensic Medicine at Monash University and the Attorney-General confirmed that he would support funding to establish this position. It was agreed that the Chair would be occupied by the Director of the VIFP, thus establishing the critical link between operational service, training and research.

In 1984, at the request of the Attorney-General, an interim Council of the Victorian Institute of Forensic Pathology was established with the Hon. John Phillips QC as its Chair. This

interim Council assisted in the negotiation of a formal agreement between the Government and Monash University for the establishment of the Chair of Forensic Medicine and for the incumbent professor to be the Director of the Victorian Institute of Pathology.



The laying of the foundation stone for the Coronial Services Centre on 2 June 1986 with Professor Graeme Schofield, Mr David Freeman, Chief Commissioner Kel Glare, Dr Gad Trevaks and Professor Vernon Plueckhahr



portfolio. The Coroners Act 1985 also enacted that the Chair of Forensic Medicine at Monash University was to be the Director of the Institute, and member of the governing Council, thus ensuring that a content expert led the Institute.

The inaugural meeting of the statutory Council of the VIFP was held on 27 May 1986 in John Phillip's Chambers at the Supreme Court of Victoria. The Chair announced at this meeting of the Council that Monash University had appointed Stephen Cordner, who was then Senior Lecturer in Forensic Medicine at Guy's Hospital Medical School in London, as the inaugural Director of the Institute and Foundation Professor of Forensic Medicine at Monash University. Professor Plueckhahn was appointed Deputy Director until Stephen Cordner was able to commence his appointment in May 1987. Over the following two years the Council met regularly to oversee the appointment of new staff and the development of the Coronial Services Centre.

A parcel of land in South Melbourne on the corner of Power and Kavanagh Streets was identified as the appropriate site of the new Centre. The new state-of-the-art building, designed by award-winning architects Bates, Smart and McCutcheon, was finally opened by the Premier of Victoria, the Hon. John Cain, on 26 July 1988 who said:

"With the opening of this Institute we leap 20 years ahead. Now, for the first time in Australia, there will be a team of Forensic Pathologists working with state-of-the-art technology in a state-of-the-art building, to provide comprehensive high quality services to the coroner, the courts and the people of Victoria. They are essential services.

The provision of expert information to the coroner and the courts is the most obvious of them. The Victorian Institute of Forensic Pathology will want for nothing in its essential task of reconstructing the circumstances surrounding a death.

The Institute was formally established by the enactment of the Coroners Act 1985. This Act provided that an independent Council, with members appointed by Governor in Council, was to be the governing body of the VIFP. The Hon. John Phillips QC was formally appointed as its first Chairman - a position he retained when he later became the Chief Justice of Victoria. Dr Gad Trevaks, the Chair of the Health Commission of Victoria, was appointed to the Council as the nominee of the Minister for Health. He strongly argued for the Institute to remain within the Attorney-General's

"With the opening of this Institute we leap twenty years ahead. Now, for the first time in Australia, there will be a team of Forensic **Pathologists working** with state of the art technology in a state of the art building, to provide comprehensive high quality services to the Coroner, the courts and the people of Victoria. They are essential services."

Over the last 30 years the skills and expertise of dedicated staff have propelled the Victorian Institute of **Forensic Medicine to international** prominence in the fields of forensic medicine and science.

... The Victorian Institute of Forensic Pathology will turn science to the service of justice and the community. Accurate autopsy diagnoses lead to accurate epidemiological data which in turn will result in accurate public health policies.

... Finally, and perhaps most importantly of all, it will offer to relatives of a deceased person an independent scientific review of whether, in the period leading up to the death, everything that could have been done was appropriate. That, as everyone here will know, is a profoundly humane service."

Over the last 30 years the skills and expertise of dedicated staff have propelled

the Victorian Institute of Forensic Medicine to international prominence in the fields of forensic medicine and science. It is an Institute that produces independent and reliable expert evidence for the justice system. It is an Institute that is unrelenting in its search for, and revelation of, the truth.

Central to the Institute's independence has been its governance by a statutorily enshrined Council that includes the VIFM Director, the State Coroner and members nominated by the Chief Justice, Melbourne and Monash Universities, the Attorney-General, the Ministers of Police, Health, Community Services and Women's Affairs and the Chief Commissioner of Police. Following the retirement of the Hon. John Phillips QC (1988-2004), the Council has been chaired by Chief Justice Marilyn Warren (2004-2008) and the Hon. John Coldrey QC (2008 to present).

One action taken by the Council was the creation of Fellowships to be awarded to persons who had made significant contributions to the development of the VIFM. Those Fellows have been: the Hon. John Phillips QC, Professors Vernon Plueckhahn and Graeme Schofield and Dr. Gad Trevaks (all members of the initial Council), Professor Robert Conyers, and Chief Justice Marilyn Warren.

Looking back over the 30 years of the life of the Victorian Institute of Forensic Medicine we have identified 30 key moments in the advancement of forensic medicine and science in Victoria - in both service provision and research. These moments take as a given the close collaboration with the State Coroner and the Coroners Court of Victoria, Victoria Police, Monash University, the Attorney-General and the Department of Justice and Regulation, for which we are extremely grateful.



Image p. 25: Southbank surrounds and the 1 Coronial Service Centre in October 1988



30 key moments in 30 years of making a difference

1988 A new centre of forensic excellence for the Victorian community



With the opening of the Victorian Institute of Forensic Pathology (VIFP) on 26 July 1988, for the first time Victoria had a purpose-built building for the provision of forensic pathology services to the coroner, courts and community. The building housed a modern mortuary and scientific laboratories as well as the State Coroner's Office and coroners courts. This physical structure created a culture of collaboration and innovation by bringing together a group of medical, scientific and legal staff committed to delivering a first-class medico-legal service that was designed to serve the administration of justice. Victoria was the first jurisdiction with a statewide coronial and pathology service. This is a model that was endorsed by the Royal Commission into Aboriginal Deaths in Custody and has been followed by other states over time.

Image: Entrance to the former Coroners Court and City Mortuary

2

1988_ Grounding operational service in academic excellence by the creation of the **Monash University** Department of **Forensic Medicine**

The Institute was both ground-breaking and unique by not only bringing together forensic medical and scientific expertise under one roof, but by including formal academic activities in its operations. The Memorandum of Understanding between the Victorian Government and Monash University saw the establishment of the Department of Forensic Medicine within the Medical Faculty, now the Faculty of Medicine, Nursing and Health Sciences. Senior medical and scientific staff were appointed to honorary academic posts, and the addition of a lecture theatre, conference room and library in the new facility allowed for undergraduate and postgraduate teaching and training. The establishment of an undergraduate course, Elements in Forensic Medicine, in the undergraduate law degree at Monash University produced a generation of lawyers with a working knowledge of forensic science and medicine. The construction of modern analytical laboratories also enabled an active research program in forensic medicine and science. The current research program is focussed on drug harm prevention, health law and ageing, injury prevention and family violence. It has resulted in many presentations and publications, including the regular Clinical, Aged Residential Care and Future Leaders Communiqués that disseminate to clinicians the lessons learnt from coronial investigations into preventable deaths.

The Institute's first information system consisted of a stand-alone proprietary word processing system for the production of autopsy reports and a few PCs to support the analytical equipment in the toxicology laboratories. As caseloads increased, it was clear that the Institute needed a laboratory information management system (LIMS) and a case management system that could integrate the medical management of patients with medico-legal report production. Ms Vicky Winship (the Institute's first staff member) developed an integrated case management system to combine data across all areas of the Institute's operations. Importantly this Unix system, based around Sun workstations and an Ingres databaseV, enabled the comprehensive analysis of casework. Research databases were also developed to improve the Institute's academic capacity and enabled the VIFP to provide the Victorian Government with essential public health and safety information that led to legislative reform and increased community safety. The VIFM continues this important prevention work today.

1988 Creating a purpose-built IT system to ensure quality, safety and integrity of VIFM's operations

Image: The Hon. Jim Kennan and the Hon. John Phillips QC launching VIFM's computer system



Prior to the establishment of the forensic toxicology service at the Institute, a small division of the State Chemistry Laboratories within the Department of Agriculture and Rural Affairs undertook toxicological investigations. It was quickly recognised that this separation of analytical services from the medical investigations was inefficient and prevented an integrated approach to the investigation of deaths. The creation of a purpose built, analytical forensic toxicology service at the Institute saw the movement of many existing toxicology staff to the new Institute laboratories, and the engagement of new expert pharmacologists and specialist toxicologists. Over the years, the Institute has supported postgraduate studies and research in toxicology that continues to underpin the development of leading edge analytical services in human toxicology.

1989_ Developing world-leading analytical services in human

5

In 1989 the Institute's Council decided to establish a formal ethics committee registered with the National Health and Medical Research Council, to provide ethical oversight of the use of human tissue and data for research purposes At the time, this was a progressive approach, because the Human Tissue Act 1982 allowed the Institute to use tissue removed during the autopsy process for a scientific purpose, without the need to seek consent from the next of kin. However, over time the Institute recognised that this provision was increasingly out of step with community expectations. It therefore established a process whereby a research project was reviewed and approved by the VIFM Ethics Committee prior to the next of kin being approached by nursing staff to seek particular consent for the use of tissue for the approved research. We have discovered that families are often eager to support research projects, particularly if they relate in some way to understanding the disease or circumstances of the death of their loved one. Families have donated tissue to support many significant research endeavours, including the development of the cochlear implant for hearing loss and research into neurological and neurodegenerative diseases facilitated by the Victorian Brain Bank



1

3

toxicology



1989_ Providing ethical oversight to research projects through the establishment of the VIFM Ethics Committee

1989_ Allowing the gift of tissue donation for bereaved families by opening the Donor **Tissue Bank of Victoria**

In 1989 the VIFP Council decided to establish the Donor Tissue Bank of Victoria (DTBV) to provide a central facility for the acquisition, processing, storage and distribution of heart valves and skeletal tissues for therapeutic transplantation. The DTBV was the first of its kind in Australia and aimed to offer relatives an opportunity to salvage something positive from the death of a loved one, by agreeing to donate tissue for transplantation. Since its inception, the DTBV has expanded to provide other tissue products, including skin that is used by surgeons for life-saving treatment for severe burns and chronic unhealed wounds. The DTBV currently provides 50% of the skin available to the Australian healthcare system. It is our experience that in a time of tragedy, donor families find great solace in being afforded the opportunity to donate tissue for the benefit of others. Last year there were 98 tissue donors - some of these donors benefited over 40 recipients.

27

6



In 1990, the new head of the Institute's scientific services, toxicologist Dr Olaf Drummer, identified a spike in deaths reported to the coroner from methadone. This discovery prompted research into the circumstances of these cases. It was found that individuals who were placed on a methadone maintenance program in order to address their opioid dependency were at greater risk of overdose in the first two weeks of treatment. The outcome of this research was published in The Lancet and ultimately led to changes in the methadone treatment program including the lowering of the starting dose. This research demonstrated one of the key goals in establishing the VIFM: using accurate autopsy diagnoses to collate sound epidemiological data which in turn will result in improved public health policies.

1990_ Critical research helps prevent methadone deaths

The sudden death of a baby or infant is always one of the most challenging investigations for our staff. In the early 1990s, the Institute was instrumental in developing a consistent approach to paediatric autopsies and to the diagnosis of SIDS (Sudden Infant Death Syndrome) in Australia. This led to the creation of the first national database of SIDS cases and provided data to researchers endeavouring to understand what causes these tragic deaths. Forensic Pathologist, Dr Peter Campbell, established an open and transparent approach for families, by offering parents of a deceased baby or infant a meeting with the forensic pathologist to discuss the autopsy findings in person. This important and compassionate approach continues today. Families often meet with staff, some many years after the death, to seek answers and support.

1991_ Creating a compassionate approach to families in the investigation of **SIDS** deaths

8

While the VIFP established forensic pathology as an independent forensic medical service in Victoria, 'Police Surgeons' employed directly by Victoria Police were delivering the Clinical Forensic Medicine service. Over time it became clear that this situation did not support the development of Clinical Forensic Medicine as a profession, leading to problems in the continuity of service and limiting the teaching and research opportunities. Active negotiations between Victoria Police, the Council of the VIFP and interested medical practitioners, led to legislative amendments to the then Coroners Act 1985 and the incorporation of clinical forensic medical services into the Institute's investigative activities.

These amendments also resulted in the evolution of the name of the Institute from the 'Victorian Institute of Forensic Pathology' to the 'Victorian Institute of Forensic Medicine'. For the first time in Australia, independent and integrated forensic medical and scientific services were created under one roof to serve the justice and healthcare systems.



1995_ Bringing all aspects of Forensic Medicine under one roof by establishing an independent Clinical **Forensic Medicine Service**

Since 1999_ Supporting the global community through humanitarian and Disaster Victim Identification (DVI) collaborations

Legal Agencies (APMLA). Recently this work has involved providing advice to the ICRC on infection control in body retrieval and mortuaries during the Ebola outbreak in Liberia and advice on dead body management for the more than 6000 dead following Typhoon Haiyan. The work we undertake overseas not only helps there, but also plays an important role in developing and honing our own skills. The VIFM's involvement in the DVI operation following the 2002 Bali Bombings and the 2004 Boxing Day tsunami (and other events as well) helped to prepare us for the 2009 Black Saturday bushfires. These large-scale operations are based on Interpol protocols and are carried out by a team of medical specialists including pathologists, odontologists, anthropologists, mortuary technical specialists, molecular biologists, fingerprint experts, and crime scene examiners. Increasingly there is also reliance on non-expert first responders. As well as lending our people, skills and resources to neighbouring countries during these times, we have a responsibility as neighbours to help them build their response skills and forensic capacity generally.

11

2000_ The creation of a national database of coronial case information for research into preventable deaths - the National Coronial Information System (NCIS)

The Institute was instrumental, together with State Coroner Graeme Johnstone, Monash University and the Victorian Department of Justice, in the development of the National Coronial Information System (NCIS) that was formally launched in 2000. It is a first of its kind in the world. The NCIS now contains medico-legal data on over 200,000 deaths reported to coroners in Australia and New Zealand, including demographic information about the deceased; contextual information about the nature of the fatality and full text reports of coronial findings; post mortem and toxicology reports; and police notification of death reports. The purpose of the NCIS is twofold; to enhance research into community hazards and public health and safety; and to improve the efficiency of coronial death investigations. Reducing preventable deaths in our community was the 'raison d'étre' of coroners and forensic pathology services and a national database to identify these cases was recognised as a major improvement initiative. The absence of a national coronial jurisdiction required a multi-state partnership and in some states and territories legislative amendments had to be made. The new database was initially established and operated by the VIFM and was later transferred to the Department of Justice. The NCIS allows researchers access to data about the causes and circumstances of reportable deaths, so they can make recommendations to reduce preventable deaths in the community.



The Family Health Information Service was established in 2002 to provide relatives of the 2002_ Providing deceased with vital health information that was determined by the pathologist during the medical investigation process. These cases often involve heritable cardiac conditions such as cardiomyopathy or aortic dissection. In the early years, the Institute referred at-risk families to general practitioners to arrange specialist appointments and screening. However, the by identifying rate of uptake was very low, leaving many family members at risk. So in 2004, we initiated a direct referral process via Genetic Health Services of Victoria (as it was then known) heritable disease located at the Royal Children's Hospital (RCH) for children and adults requiring cardiology screening. In 2007 we commenced referring close family members to a dedicated adult service established at the Royal Melbourne Hospital, that includes a specialised cardiac genetics clinic. This service aims to identify and intervene in cases of potentially preventable cardiac deaths via early referrals, consistency of information collation, and the provision of coordinated care between adult and children's services. It is a potentially life-saving service that we are very proud to provide the families of Victoria.

9

10 The Institute collaborates with leading global organisations to

plan and deliver international humanitarian responses, undertake forensic investigations and to contribute to capacity development. These organisations include the International Committee of the Red Cross (ICRC), the United Nations Office of Drugs and Crime (UNODC), the World Health Organisation (WHO), the International Criminal Court (ICC) and the Asia Pacific Medico-

Image: Dr Soren Blau training in Timor Leste



12

answers to families

2004_Improving techniques for the identification of deceased people - the establishment of the Centre for Human Identification



In 2004 the Institute established the Centre for Human Identification (CHI) with the assistance of funding for counter terrorism activities. The Centre brought together the expertise of forensic odontologists, anthropologists and entomologists to provide specialist services in human identification. These disciplines complemented the VIFM's existing forensic pathology and mortuary based technical disciplines. The Centre strengthened Victoria's capability to identify unknown bodies and to respond to Disaster Victim Identification events by undertaking research. exploiting modern technology to develop more effective techniques for human identification and by providing training to the VIFM staff and external agencies. In 2007 the CHI evolved into Human Identification Services (HIS) which forms part of the Forensic and Scientific Services Division of the Institute. This integration has enabled the better coordination of the work of the HIS with the other forensic services at the Institute, including the Molecular Biology Laboratory.

14

2004_ Developing roadside drug testing techniques to reduce the road toll



In 1988, the Institute commenced toxicological testing of all drivers who died in motor vehicle accidents. This routine testing of deceased drivers for the presence of drugs in addition to alcohol created a prevalence dataset that enabled us to understand the level and type of drugs involved in driving fatalities. Using the Victorian data, Professor Olaf Drummer developed and then used a culpability analysis for the risks of driving under the influence of drugs and then extended the study nationally. This foundation research and the academic papers that followed, formed the basis of submissions to the Victorian Parliamentary Road Safety Committee, that advocated for random roadside drug testing for methylamphetamine and delta-9tetrahydrocannabinol (the active ingredient of cannabis). These recommendations were accepted and funded by the Victorian Government, leading to the introduction of random roadside drug testing by Victoria Police in December 2004. This program which aims to reduce the road toll due to drug affected drivers is a worldwide first. In 2006 on the basis of ongoing drug analysis from the laboratory, we recommended that ecstasy be added to the drugs that are tested at the roadside.

15

In 1988 post mortem radiology facilities were built into the Institute, and this was a novel feature at the time. By the turn of the millennium it was becoming clear that even in post mortem practice traditional radiological techniques were being superseded by computerised 3D imaging techniques such as computerised tomographic (or CT) scanning. Planning for the 2006 Commonwealth Games in Melbourne had identified the need for enhanced disaster/fatality management capacity and post mortem CT scanning was considered ideally placed to assist with this. It was also realised that this technology could be used to better investigate deaths and injury, possibly obviating the need in some cases for autopsy. This would obviously be welcome where cultural or religious factors made performing an autopsy problematic for particular communities.

2005_ Incorporating post mortem CT scanning to better investigate death and injury and to reduce the need for autopsy

Reforms to the Coroners Act in 2008 and the introduction of the 2008_ Providing the Victorian Institute of Forensic Medicine Act 1985 created a new standard of medico-legal death investigation. This led the way throughout coroner with better Australia for a risk-based evaluation of the investigation process required for each death reported to the coroner. The Coroners Act 2008 information to determine allowed, for the first time, the 'preliminary examination' process to commence upon receipt of the body. The preliminary examination the direction of the is defined to include a range of investigative procedures including fingerprinting, dental examination, the collection and evaluation of coronial investigation medical records, post mortem CT scans and blood tests for toxicology. VIFM introduced rapid overnight toxicology testing for 132 drugs in 2009. In 2018, after a long period of development, this list of 132 drugs has been expanded to 327 resulting in a significant increase in the number of drugs detected as well as a reduction in the times needed for analysis. The preliminary examination report provides the coroner with essential information about the death and, combined with the wishes of the family, allows the coroner to be 'best informed' by the forensic pathologist about the course that the death investigation should take. In practice this new preliminary examination process reduces the autopsy rate of coroners' medico-legal death investigations to less than 50 per cent, keeping costs down without sacrificing the integrity of the post mortem death investigation.

17

2008_ Doubling of the forensic pathology workforce and the rebuilding of the VIFM to deliver better forensic pathology services

In 2008 the Chief Operating Officer Mari-Ann Scott led the development of a business case that resulted in more than 20 additional forensic pathology staff and the complete redevelopment of the building. After 20 years the VIFM facilities were worn, outdated and presenting an occupational health and safety risk to the staff. The areas rebuilt included the mortuary, the suite for families to view the body of the deceased, refurbished laboratories, new office areas to accommodate the extra staff and new essential building infrastructure. In addition, the Institute was successful in securing a grant from the Commonwealth Health and Hospital Fund to build a new facility for the Donor Tissue Bank of Victoria.

2008 - 2018_ Increasing the power of DNA analysis to identify the missing and unknown

Image: Ms Michelle Spiden, Molecular Biology Laboratory





18

One of the most significant developments in forensic science since the Institute opened its doors is the advancements in molecular biology through DNA analysis. The core focus of the molecular biology laboratory is the identification of deceased persons whose deaths have been reported to the coroner. We also work with Victoria Police to manage the Missing Persons DNA database for Victoria. On occasion, bodies transferred to the VIFM mortuary are skeletal remains, severely decomposed, or unidentifiable due to fire or trauma. In these cases where visual identification is not possible the extraction and analysis of DNA to compare with DNA taken from a family reference sample can provide the identity of an

individual. The VIFM's research into DNA extraction techniques has resulted in significant improvements in the quality and quantity of DNA that can be analysed from degraded human remains and the speed in which reports can be provided to the coroner. In particular, we can now extract DNA from degraded bone samples, as well as toenail clippings and bladder swabs. These techniques have application in the identification of deceased persons in a mass disaster victim identification event (DVI), following a bushfire, plane crash, tsunami or civil conflict. As a member of the ANZPAA Biology Science Advisory Group, the laboratory has also contributed to the development of national standards, such as the adoption of 18 core loci for Australia, as well as the standardisation of mixture interpretation through the use of STRmix.

19 The year of 2009 started with the Institute's biggest ever-operational challenge. In January of that year Victoria was gripped by an intense heatwave that resulted in 374 excess deaths, of which more than 100 were reported to the coroner. The resources of the Institute were already stretched to the limit when on 7 February bushfires tore through 78 Victorian townships killing 173 people, injuring 390 and destroying 2500 homes. The Institute's disaster plan was activated on the evening of Black Saturday and on Sunday afternoon the first 14 deceased arrived at the mortuary. The INTERPOL Disaster Victim Identification (DVI) process was instituted, and over a period of weeks the Institute assumed responsibility for nearly 300 DVI cases (representing ultimately 163 deaths). Three months after Black Saturday the painstaking process of reconciliation and checking case information was completed, allowing the Identification Board, chaired by the State Coroner, to formally conclude the identification of 163 deceased people. A further 10 people died in hospital from their injuries but did not go through this DVI process. The identification of all victims allowed the remains to be returned to families for burial, and in some cases it was also possible to identify the remains of pets and other animals that were found with the deceased.

2009_ Supporting the Victorian community identifying the victims of the 2009 Victorian bushfires



20

2010_ Introducing new post mortem CT techniques to reduce the need for full autopsy



With the establishment of routine post mortem CT scans as part of the preliminary examination process, the Institute looked for new ways to enhance imaging techniques to streamline and improve death investigations for the coroner. CT angiography was already being explored in a number of jurisdictions around the world and the Institute introduced this technology into Victoria. Different contrast media were evaluated and the technique was soon surpassing autopsies as a means of identifying the source of bleeding in major areas of the body, in particular the abdomen. With the establishment of this technique the Institute began to evaluate the use of CT guided percutaneous biopsy, for obtaining tissue for histological diagnosis of underlying disease processes that may have contributed directly or indirectly to a death. The opportunity to carry out these scientifically validated investigations has further strengthened the Institute's post mortem death investigation capacities, in some cases even obviating the need for traditional autopsy.

21

In 1922 Colin Campbell Ross was convicted of the murder of a 12 year-old girl, Alma Tirtschke. At the trial the prosecution claimed that hairs on a blanket in Ross's possession matched a sample of the victim's hair making it the first Australian legal case in which hair comparison evidence resulted in a conviction. Despite always maintaining his innocence, Ross was hanged at the Old Melbourne Gaol in April 1922. In 1995 Mr Kevin Morgan, author of the book Gun Alley, was granted access to the trial brief for the case. The brief included the original hair exhibits presented at Ross's trial. A re-examination of the hair samples by the VIFM (Dr Bentley Atchison) and the Australian Federal Police (through the work of Prof James Robertson) determined they were not from the same scalp. This new evidence formed the basis of a Petition of Mercy that drew on the historic research by Mr Morgan and was signed by relatives of

both Colin Ross and Alma Tirtschke. Victorian Supreme Court Judges Bernard Teague, Phil Cummins and John Coldrey examined the evidence and found a miscarriage of justice had occurred and that Colin Ross was wrongly convicted. After receiving this advice, the Hon. Rob Hulls (then Attorney-General) moved to have Colin Ross posthumously pardoned. On 27 May 2008 the Governor signed the pardon and it was announced in Parliament. In 2010 the VIFM's forensic anthropologist and odontologist identified the skeletal remains of Colin Ross from a group of prisoners' remains that had been exhumed from Pentridge Prison. The remains were returned to the Ross family so they could finally provide Ross with a Christian burial.

2010_ Identifying the remains of executed prisoner Colin Campbell Ross, following his posthumous pardon, to enable a family burial

Image: Mr Colin Campbell Ross





Image: Mr Keith Brereton, forensic technician. with international pathologists

The Institute's international engagement is as old as the organisation itself, and for good reason. International fellows enrich the environment of the Institute while also building key capacities for their developing nations. There are very few places in the world that provide first class training in forensic medicine and allied sciences for international trainees. We know that poor forensic medical and scientific services erode the effectiveness of national justice and public health systems. Since the early 1990s the VIFM has hosted 25 Sri Lankan forensic doctors for training placements for at least 12 months. In addition the VIFM staff members have participated in missions to Indonesia, East Timor, Papua New Guinea, Tonga, Fiji, Vanuatu, Norfolk Island, Kiribati, Thailand, Samoa, Nepal, New Zealand, Kosovo and the former Yugoslavia, DRC Congo, Botswana, Iraq, Liberia, Myanmar, Afghanistan and the Philippines. In August 2011, the VIFM Council formally endorsed the work of the International Program as part of the Institute's strategic direction. This decision marked the need to move from an ad hoc and reactive response to a formalised and planned approach to international work.

23

The most widely reported investigation by the VIFM has been the identification of the skeletal remains of the Victorian bushranger, Ned Kelly. The investigation started with the excavation of bodies of executed prisoners at the Pentridge Prison site north of Melbourne. These prisoners had originally been buried at the Old Melbourne Gaol in the 19th and early 20th century and were reinterred at Pentridge Prison following the redevelopment of the gaol in 1924. We suspected that Ned Kelly's body might be amongst these boxes of skeletal remains, but there was no clear evidence to prove this. An investigation involving historical research, anthropology, odontology, forensic pathology and DNA analysis resulted in the unlikely identification of Kelly's almost complete skeleton. Contrary to expectation, the skeleton included a part of his skull. The identification of the remains provided the opportunity to return them to the descendants of the Kelly and King families, so that they could bury him in the cemetery at Greta near his mother and other family members.

2011 The VIFM identifies the skeletal remains of executed bushranger Ned Kelly



2013_ Providing better support for families of the deceased the establishment of Coronial **Admissions and Enquiries**

32

2011_ Making a difference on the international scene



Image: Associate Professor Soren Blau and Professor Stephen Cordner

24

The creation of the Coronial Admissions and Enquiries (CAE) unit within the VIFM represented a major improvement for medico-legal death investigations in Victoria. It reduced the inefficiencies caused by duplication of effort where court registry staff and Institute nursing and technical staff collected much of the same data and had similar conversations with families. The CAE medical management of the front-end of the coroner's death investigation process resulted in expert medical and nursing staff supporting families through the process and providing advice and compassion at a very difficult time. Staff collect the relevant medical, social and investigative information required to inform the medico-legal investigation carried out by the forensic pathologist and the coroner. At the heart of this process is the daily case conference between pathologists, coroners and CAE nurses to determine the level of investigation required, to reduce the need for unnecessary tests and to minimise delays in the release of the body.

The development of clinical forensic medicine as a formal medical specialty in Australia has been limited by its lack of association with one of the specialist Royal Colleges. Formal training programs meeting specialist accreditation requirements could not easily be developed and this restricted the recruitment of medical postgraduate trainees to this discipline. With the incorporation of specialist clinical forensic medicine services into the VIFM, it became essential that the Institute work to improve the professional standing of its forensic physicians in order to ensure continuity of service, and the development of advanced teaching and research in this field. Discussions with the Royal College of Pathologists of Australasia, who had already established faculties of pathological science and oral pathology, led to the development of a faculty of clinical forensic medicine. Institute medical staff including Professor David Ranson, Associate Professor Morris Odell and Dr Angela Williams formed part of the foundation faculty management and education committees that led to the development of a formal curriculum for postgraduate training in this field.

2014_ Improving the professional standing of Clinical **Forensic Medicine**

2015_ Removing delays by abolishing the need for death verification from hospital emergency departments 26

Up until 2015, funeral industry contractors who transported a deceased person to the Institute for medical examination were required to ensure that the death had been verified by a doctor, nurse or ambulance officer before transfer to the mortuary. Often the body transport contractors would be forced to attend a hospital emergency department to have the required form signed by an on-duty doctor. Long waiting times

for a doctor to become available to verify the death was not uncommon. The practice caused delays to the coroners' death investigation processes and contractors incurred significant costs to sit 'ramped' at the emergency departments. The VIFM legal team looked for the legislative or other regulatory requirement for death verification, only to find there was none. It was established that death verification was a practice designed to reassure the body transport contractors that they were not mistakenly transporting a non-responsive live person to the mortuary. A risk analysis was undertaken and a decision was made to change the coroner's forms and inform the contractors they no longer needed to have the deaths verified. If they, or VIFM's mortuary staff ever considers that a mistake had been made about death having occurred, the appropriate and common sense course of action is to immediately call an ambulance and administer any relevant first aid.

27

From 2016, the Institute has provided data on all cancer diagnoses following an autopsy to the Cancer Council, Victorian Cancer Registry, under the authority of the Improving Cancer Outcomes Act 2014. We are in a unique position to diagnose, via the post mortem examination, previously undetected cancers that are incidental to the cause of death. In fact the majority of cancers we report to the Victorian Cancer Registry fall into this category. This information is critical for research and public health programs and allows families to identify potential cancer risks. In cases where a cancer has been detected in a deceased person, the Institute refers family members to clinical specialists for advice. Additionally, we collaborate with the Peter MacCallum Cancer Centre to undertake urgent autopsies (within four hours of death) on individuals who have died of advanced metastatic disease and who have provided consent before death, to enable the donation of metastatic tumour tissue and clinical data. This tissue and data supports the CASCADE research program whose eventual aim is to improve the outcome for patients with metastatic cancer, to better understand the process of metastasis and why some tumours stop responding to treatment.

2016_ Forensic investigations contributing to better understanding cancer

Image: Professor David Bowtell (far right) and the Peter MacCallum Cancer Centre CASCADE Research Team



In 2016, the Victorian Royal Commission into Family Violence submitted its final report. The Institute provided a submission to the Commission regarding the expansion of its forensic medical examination service to specifically respond to victims of family violence. The Commission recommended that Victoria Police should actively seek access to forensic medical examinations in family violence matters from the VIFM. In response, we are currently participating in a pilot project at the Dandenong Multidisciplinary Centre to carry out family violence examinations in its dedicated consulting room. The evidence gathered may be used by Victoria Police to prosecute the perpetrators of family violence. The pilot has enhanced our knowledge of the forensic medical issues associated with family violence matters, and these learnings have been incorporated into the statewide services provided by our mobile team of clinical forensic practitioners and forensic nurses. The VIFM is also working with Victoria Police to offer training to new recruits and family violence investigators. The Department of Forensic Medicine has established a dedicated research unit, Violence Investigation Research and Training Unit (VIRTU) to develop evidence-based recommendations to mitigate the risk of injury and violence, and also runs a short-course in family violence for legal and healthcare practitioners.



29

2016_ Providing autopsy reports to families in Plain Enalish

In 2016 the VIFM introduced a significant innovation in the provision of medical examination reports (MERs) to families by the development of Plain English MERs for Ischaemic Heart Disease deaths - initially as a Pilot Project. The MER is a technical document, created primarily for a professional legal and medical audience and it typically uses medical terminology with little or no explanation of the meaning of these technical words. Some family members find the contents difficult to understand or confronting, particularly the detailed observations of the dissection of the body. The Plain English MER includes the key outcomes of the autopsy and houses these paragraphs in a Plain English template. It has a glossary of medical terms and a simple information sheet explaining the medical condition causing death. The next phase of this project involves applying the Plain English format in all cases.

In October 2017 the VIFM and the Coroners Court of Victoria commenced a significant pilot program to improve the investigation of deaths resulting from complications of a femoral fracture. Approximately 10-15% of the deaths reported to the coroner are due to complications of a femoral fracture following a fall. The majority of these deaths concern the very elderly in our community, often living in care or hospitalised. Falls resulting in a death are reportable to the coroner on the basis that they have "resulted directly or indirectly from an accident or injury". The need for a coronial investigation in these cases often surprises and distresses families, and it is the experience of the VIFM's forensic pathologists that in the vast majority of age-related fracture cases, the medical examination of the body essentially confirms the findings expected from a review of the medical records. The pilot process removes the need for bodies to be brought to the VIFM mortuary in femoral fracture cases. These deaths continue to be reported to the coroner, but the body remains in the hospital mortuary until released by the coroner. There are safeguards to ensure that the body is admitted to the VIFM mortuary for examination, if families, the forensic pathologist or the coroner hold concerns about the external cause of death. Hospitals, funeral directors and families have been very supportive of this new approach to a common cause of death for our elderly.

2016_ Creating a Family **Violence Service for victims**

30

2017_ Avoiding unnecessary investigations and delays for femoral fracture deaths in the elderly

