

# History of Forensic Odontology in Australia

Anthony W Lake (*BDS FPFA FICD, Forensic Odontology Unit, University of Adelaide*)

## Forensic Odontology around the world

Records indicate that for at least two thousand years the use of dental identification has been recognised. In his writings on the History of Rome around 229 AD Dio Cassius recorded that Agrippina, mother of Nero, in 49AD, had Lollia Paulina, wife of Gaius, murdered and on having the head presented to her did not recognise it until she opened the mouth and inspected the teeth and identified some distinguishing dental features<sup>1</sup>.

Over the centuries many cases have been recorded of body identification using the teeth and dental appliances<sup>2-5</sup> but it was not until a fire on May 4<sup>th</sup>, 1897 at the Bazar de la Charité in Paris where 126 died, including a number of prominent Parisians of the day, that a scientific approach to dental identification for legal purposes was initiated. Even though it was the Paraguayan Consul, Albert Haus, who suggested asking the dentists of the missing to assist in the identification process using their records, it was Oscar Amoëdo, a professor at the 'Ecole Odontotechnique de Paris, who received the credit. Following publication of his thesis 'L'Art Dentaire en Médecine Légale'<sup>6-8</sup>, a text drawn from his studies of the literature, extensive personal knowledge and experiences and material compiled from the disaster of 1897, many considered Amoëdo as the father of Forensic Odontology<sup>9</sup>.

Following World War II there was a need in Europe for identification of war victims, perpetrators of war crimes and those involved in mass disasters. Forensic dentistry rapidly gained recognition especially in the Scandinavian countries<sup>10</sup>. Dental and other forms of identification became more scientifically based and dental schools started to introduce forensic odontology into their courses. Norway was probably the first country to establish compulsory lectures for under-graduates. These began in 1947 with Ferdinand Strøm conducting them at the Universities of Oslo and Bergen<sup>11</sup>. In 1948 the American Academy of Forensic Sciences had its first dentist join and its second was in 1966. It was considered in that country forensic dentistry fitted within the framework of forensic medicine and pathology and the first forensic dentistry course was held in 1962 at the American Forensic Institute of Pathologists in response to demands by dental defence force personnel<sup>12,13</sup>. In 1981 it was reported that the first university-based forensic dentistry student course in the US had been introduced into the New York University College of Dentistry as a three month elective<sup>14,15</sup>.

## Defining Forensic Odontology

The word combination "Forensic Odontology" has been reported as originating from a book of that name written by Professor Gøsta Gustafson<sup>16,17</sup>. In Australia the term Forensic Dentistry was initially preferred and in 1983 a national society was

formed with the title Australian Society of Forensic Dentistry. At a meeting of members attending the Inaugural Centre for Human Identification Cross Disciplinary Symposium at the Victorian Institute of Forensic Medicine in November 2006 it was recommended by those present that the name be changed to the Australian Society of Forensic Odontology and that the field be referred to as Forensic Odontology in the future. This was put to members for a vote and subsequently accepted. The purpose was to clearly identify this area of forensic science as a specialized field of dentistry but with broader boundaries. It also reflected international dental and legal terminology currently in use.

The Dental Board of Australia defines Forensic Odontology as “The branch of dentistry that is involved with the examination and evaluation of dental evidence, which may then be presented in the interests of justice.”<sup>18</sup> It defines also the areas of involvement-

- Identification of unknown human remains
- Identification of unknown deceased individuals following mass disasters
- Examination and assessment of bite mark injuries
- Examination and assessment of facial injuries following assault or trauma
- Age assessment of both living and deceased persons
- Examination and assessment of child abuse injuries
- Civil cases involving malpractice and fraud allegations

Many of the roles comprising Forensic Odontology have developed in more recent times with a demand for those services by the community and the expansion of research and establishment of scientific protocols based on the results<sup>19-23</sup>. Other roles are emerging where the forensic odontologist might be able to assist in identification of living individuals as well as the deceased using techniques currently available. One such example is computer based cranio-facial superimposition of photographs from a crime scene with those of suspects.

### **The growth of Forensic Odontology in Australia**

In Australia it was not until the late 1960's that forensic dentistry started to be recognised as anything more than an unpleasant experience for general dentists, oral surgeons and dental school staff who were asked by police on an ad hoc basis to assist with identifications. Generally there was little or no financial recognition of services provided, no equipment available, apart from the dentist's own property, and no training and it was up to the individual to develop their own methodologies with little or no peer review and dental reports were generally accepted without question by the legal profession and the courts. In some cases body parts were delivered to the dentist's consulting rooms or their home for an opinion on a case. It is a wonder anyone would have willingly taken on this legal, professional and community responsibility<sup>24,25</sup> under those conditions.

A notable example that did identify the limitations at the time was in 1934 when a burnt body was recovered from a culvert near Albury. Because it was partially clothed in pyjama material it became known as the 'Pyjama Girl' case<sup>26,27</sup>. In this case a local dentist examined the body several times, extracting teeth to assist his

court presentation. He failed to identify all restorations correctly and misidentified one of the teeth. The suspected victim's dentist did not keep formal records but compiled an ante mortem charting based on his financial accounts and recollections. Together, this resulted in the body remaining unidentified for another 10 years. In 1944 police asked another dentist to re-examine the post mortem dental evidence. The dentist was more thorough and identified all the restorations present. The result achieved a matching of the remains with the ante mortem records of Linda Agostini. Her husband subsequently admitted murdering his wife. Involvement by dentists at that time was largely reliant on the investigating police officer being aware that identification might be possible using the teeth. In the Pyjama Girl case police contacted all Melbourne and Sydney dentists and all other dentists in Australia and New Zealand were sent photographs of the extracted teeth set up in plaster. In the years that followed little recognition by the dental profession was forthcoming and generally it was only as a result of police generated requests that supplements and circulars appeared in Australian Dental Association branch newsletters. Formats varied, consisting of dental text descriptions, photographs showing dissected jaws or full body images. In the early 1960's circulars from police appeared which included odontograms with detailed dental descriptions provided by more highly qualified dentists<sup>28,29</sup>. Apparently these requests to the dental profession resulted in little success and today this approach is no longer generally used.

## **Forensic Odontology histories of the States and Territories**

### **Victoria**

In Victoria in the 1950's Forensic Odontology services were conducted by general practitioner Dr Gerald Dalitz. Prior to this time, no formal training was available within Australia and all casework and opinions were handled on an ad-hoc basis. Having completed postgraduate studies in orthodontics, Dalitz completed his PhD thesis in 1958 covering the relationship between the human dentition and aspects of human identification. Most of his early odontology case-work was completed on a pro bono basis when expertise was sought by police. In 1979, Dr Ross Bastiaan joined Dalitz and in 1981, with assistance from Dr Hector Orams, a Disaster Victim Identification team of dental volunteers was established. Following the 1983 Victorian Ash Wednesday bushfires this team identified 14 of the 22 deceased<sup>30</sup> through comparisons of ante-mortem dental records and post-mortem dental data. By 1984 dental undergraduates at the University of Melbourne, were receiving two one-hour lectures and a two-hour practical exercise on forensic odontology as part of their dental anatomy course. In 5th year they had a one-hour lecture as part of Dental Medicine and Surgery. Lecturers were Brian Radden and Hector Orams<sup>31</sup>. Lectures were also provided by Dalitz in the early 1970's. A one-day course was available for graduates as part of the continuing education program<sup>32</sup>.

By 1987 Bastiaan had been joined by private practitioner Dr Lloyd O'Brien in managing forensic odontology services in Victoria as part of Forensic Pathology. It was around this time that overtures began regarding a more formal relationship between those dentists performing forensic odontology services and the University of Melbourne Dental School. In 1989 Professor John Clement, a noted Forensic Odontologist from the United Kingdom, took up a position at the University of

Melbourne<sup>9</sup>. Shortly after his arrival he formalised Forensic Odontology training by introducing a post-graduate Diploma course, the first of its kind in Australia. The ethos of the program has continued to expand and now includes training of graduates for the both the Masters in Clinical Forensic Medicine and Doctor of Philosophy. He was appointed to the Chair of Forensic Odontology by the University of Melbourne. It was during this period that a formal structure was effected between the University's Dental School and the Victorian Institute of Forensic Medicine (VIFM). Those that have received Forensic Odontology postgraduate qualifications in Victoria are:

Pam Craig  
Anthony Hill  
Linda Steinberg  
Jeremy Graham  
Nils Broders  
Richard Bassed

Vaum Kimber  
Carl Leung (Hong Kong)  
Zaf Khouri (New Zealand)  
Suhail AlAmad (Jordan/UAE)  
Pam Gower  
Alain Middleton

Russell Lain  
Stephen Knott  
Mark Leedham  
Tom Pacza

Today Victorian Forensic Odontology services are provided through the VIFM. The foundation Director of the Odontology Unit was Professor Clement, supported by a team of 8 fully qualified Forensic Odontologists who worked on a rotational basis to cover investigative casework. In 2004 Dr Anthony Hill was appointed head of Forensic Odontology and the team has provided regular services to the State of Victoria, 24 hours a day, 7 days a week.

Nationally, the Victorian Forensic Odontology Unit has successfully assisted in disaster victim identifications in the following Victorian cases:

- 1983 Ash Wednesday Bushfires (22 deaths)
- 1996 Kew Cottages Hostel fire (9 deaths)
- 1998 Linton Bushfires (5 deaths)
- 2006 Donald car accident ( 8 deaths)
- 2007 Kerang train crash (9 deaths)
- 2007 Burnley Tunnel crash (3 deaths)
- 2009 Victorian Black Saturday Bushfires

In the 2009 Black Saturday Victorian bushfires 174 people died. Because of the size and complexity of the disaster members of the forensic odontology community from within Australia, New Zealand, Indonesia and Japan were called to assist. This was the first time that Forensic Odontologists have work together on an investigation of this scale within Australia.

Internationally, Victorian Forensic Odontologists have been deployed during the:

- Bali terrorist bombing disaster (2002)
- Thailand tsunami disaster (2004 - many in Command and Co-coordinator positions)
- Tonga political unrest (2004)
- Jogjakarta plane disaster (2007)
- Indonesia earthquake disaster (2009)
- Papua New Guinea helicopter disaster(2012)

Following the 2004 Indian Ocean Tsunami the VIFM has taken on the role of coordinating specialist disaster victim identification teams for the Australian Federal

Police in conjunction with the Australian Society of Forensic Odontology. In addition to mortuary services and postgraduate training, the Institute has hosted a Cross Disciplinary Symposium involving Forensic Odontology (Nov 2006), the first of its kind in Australia. It has provided training courses for police, fire and ambulance staff and lectures to law students, coronial staff and general dentists. Internationally, it has provided courses in Hong Kong, Singapore, Sri Lanka, Indonesia, Nepal, Fiji and the United Arab Emirates<sup>32</sup>.

## **South Australia**

In 1961 Professor Gustafson, a well-known exponent and author of many texts on Forensic Odontology and later to become the first Chair of the International Society of Forensic Odonto-Stomatology (later IOFOS), was invited to Adelaide by the University of Adelaide Postgraduate Committee in Dentistry. He addressed dentists, police and members of the legal profession<sup>34</sup> at an ADA SA Branch meeting on March 16. In 1965 the ADA (SA) newsletter included a Police Department request for 'details from any dentists who may be using a special mark on dentures'<sup>35</sup>. No records appear to be available as to the reason for this request. In June 1967 at another meeting of the ADA (SA) Branch Inspector Calder of the South Australian Police addressed dentists and 'very strongly' indicated a need for marking dentures and maintaining accurate dental charts that could be used in the identification of bodies. He also indicated that denture marking was 'extensively' carried out in Western Australia, at the dental hospital in N.S.W. and that in Victoria it is taught to students<sup>36</sup>. At the following July ADA (SA) Board meeting it was decided to ask the Dental Board of South Australia to follow this up and the Dental School indicated its support. Today marking of dentures still has in-principle support from the ADA (SA), the Dental School and SA Dental Services but has not been implemented. At the ADA (SA) 1967 Board meeting<sup>37</sup> it was also resolved to form a Forensic Dentistry Committee and 'any members who are interested in this aspect of Dentistry are invited to contact either the President or the Lay Secretary'. Dentist Mr Kenneth Brown alone responded and this started the process towards establishing the first dedicated forensic odontology unit in Australia at the University of Adelaide and one of only a few internationally at that time. Prior to 1970 dental identification of human remains in South Australia was carried out by a pathologist assisted by police officers<sup>38</sup>. In 1978 a Disaster Victim Identification Team was established by Drs Kenneth Brown and Anthony Lake at the University of Adelaide's old Medical School and this continued for four years before disbanding. The team was re-established again in February 2006 and is still active, holding regular training workshops which were initially held at the ADA (SA) and more recently at the Forensic Odontology Unit, University of Adelaide.

In 1979, with the support of the SA Police and in response to one of the recommendations by her Hon. Justice Roma Mitchell, Chair of the Criminal Law and Penal Methods Reform Committee, a long term contract was signed between the University of Adelaide and South Australian Government. A position of Senior Lecturer in Forensic Odontology was created for Dr. Brown and the Forensic Odontology Unit commenced on January 1 1980. The Unit's role was to provide forensic dental services to the State Coroner and Commissioner of Police, undertake research, train specialists and educate the public. The first Postgraduate course in Forensic Odontology in Adelaide was held on 3-5th November 1980 at the Dental

School, Frome Road, and was attended by Australian Defence personnel and one general dental practitioner. Topics covered included Disaster Victim Identification (DVI), Police Scientific investigation methods, Forensic Pathology, the Expert witness and scientific protocols needed for forensic odontology investigations. The use of odontograms based on the work of Professor Søren Keiser-Nielsen (Royal Dental College, Copenhagen) was also demonstrated. The Unit was provided with a grant by the newly formed Australian Federal Police (AFP) to initiate a research program in areas of benefit to the police. Projects funded by the AFP between 1980 and 1985 were on the microbiology of bite wounds, development of an internationally compatible dental identification system for use in mass disasters, *OdontID*, and development of techniques and equipment for use in craniofacial video superimposition. The Unit also provided lectures to police forensic science staff, DVI officers and detectives-in-training throughout Australia.

In 2011 the government services provided by the Unit were cancelled for one year. At the time some senior government politicians and police considered Forensic Odontology obsolete and DNA a replacement. Prior to this the Unit provided services on a 24 hour, 7 days a week basis. Following a new contract being negotiated between Forensic Science SA and the University of Adelaide in 2012 the police and coronial services changed to a sessional format but the Unit's educational role within the University remained unchanged. Since its inception the Unit has had three Directors, Drs Kenneth Brown (1980-2000), Jane Taylor (2001-2005) and Helen James (Acting Dir. 2004-5, Dir. 2006- ), and has always remained part of the University of Adelaide. It was originally housed in the Old Medical School on Frome Road adjacent to the Dental School and then in 2009 was transferred to North Terrace, opposite the University of Adelaide Mitchell Building.

In 1987 the Unit accepted the role of managing and publishing the Journal of Forensic Odonto-Stomatology, the only international scientific publication available up to the present time that is dedicated to forensic odontology. It is also the official publication of the International Organization of Forensic Odonto-Stomatology (IOFOS). In December 2009 the Journal was transferred to New Zealand and converted to a web format. During the Journal's residency in Australia the Editors'-In-Chief have been Assoc. Prof Cyril Thomas (1987-2003) and Dr Helen James (2004-2009). Dr Anthony Lake was Board Secretary/Treasurer from the time of the Journal's transfer from South Africa in 1987 until it was relocated to New Zealand in 2009. During the time the Journal resided in Adelaide it had two compiler-managers, Mrs Mary Pierce and Mrs Elaine Formenti, who also held secretarial roles with the Unit. Over the years the Unit has provided undergraduate lectures and postgraduate courses for both local and international dentists and specialists and has provided speakers to a large number of community groups. It has hosted many overseas forensic specialists, especially from Japan and Europe wishing to carry out joint research projects and trained many local and international postgraduate students towards gaining a Graduate Diploma in Forensic Odontology, Bachelor of Science in Dentistry (Honours), Master of Philosophy / Master of Science in Dentistry and Doctor of Philosophy. Within the Unit, the first Honours (1988) and Masters (1992) Degrees of Science in Dentistry were awarded to Dr Jane Taylor and the first Graduate Diploma in Forensic Odontology was received by Dr Joe Tuisuva in 1991. South Australian post-graduate degree recipients from the University of Adelaide have been:

Jane Taylor (Australia)	Hons, MScDent	Chalam Singthong (Thailand)	GDipForOdont
Phraba Nambiar (Malaysia)	MScDent	Soni Stephen	MDental Surgery
Joseph Tuisua (Fiji)	GDipForOdont	Giac Cirillo (Australia)	GDipForOdont
Helen Sinclair (James) (Australia)	GDipForOdont	Kain Rowlings (Australia)	Hons
Karla Rajacopalan (India)	Hons	Sherlin Chiam (Singapore)	GDipForOdont
Benjamin Tidswell (Australia)	GDipForOdont	Denice Higgins (Australia)	GDipForOdont,PhD
Garag Girgis (Egypt)	GDipForOdont	John Berketa (Australia)	GDipForOdont,MPhil
Subhash Joshi (India)	Hons	Zaliha Ismail (Malaysia)	GDipForOdont
Catherine McKenna (UK)	Hons	Lyndall Smythe (Australia)	GDipForOdont
Somasundaram Ganesharatnam (Sri Lanka)	Hons	Atika Ashar (Australia)	GDipForOdont,PhD
Mohd Ilham Haron (Indonesia)	MDental Surg	Ahmad Fauzi (Indonesia)	GDipForOdont
Mohd Fadhli Kharmis (Malaysia)	GDipForOdont	Astiti Handayani (Indonesia)	GDipForOdont
	PhD	Kenneth Brown (Australia)	DDSc
Ashith Acharya (India)	GDipForOdont		

At the time of writing the Unit personnel consist of Director Dr Helen James, Drs Denice Higgins, Giac Cirillo, John Berketa and Anthony Lake and Secretary Mr Tom Harper. The Unit's founder, Dr Kenneth Brown received an Order of Australia (AM) award for services to Forensic Odontology in 2006 and Life Membership of the ADA South Australian Branch. Dr Helen James received an Overseas Humanitarian Service Medal for services during the Thai Tsunami DVI process.

Cases involving dental identification in South Australia have included the

- 1974 Identification of remains of Allendale East Sinkhole divers
- 1983 Ash Wednesday Bushfires (28 deaths)
- 1987 Marino Rocks Great White Shark fatality
- 1978 Identification of Truro Murder victims (7 victims)<sup>39</sup>
- 1980-2 Azaria Chamberlain Case<sup>40</sup>
- 1995 Age assessment of Abdul bin Turkey Brunei Darussalam<sup>41</sup>
- 1979-1983 Family Murders (5 victims)
- 1983 Ash Wednesday Bushfires (28 deaths)<sup>42</sup>
- Whyalla Airlines crash (8 deaths)
- 1996 Haigh Chocolate Factory Burglary (bitemark case)
- 1999 Snowtown Murders investigation (11 victims)
- 2006 Gladstone explosives factory disaster (3 deaths)
- 2011 Lake Eyre helicopter crash (3 deaths).

On the global scene Kenneth Brown represented Australia on numerous occasions on international committees and as a speaker and coordinator at conferences and forums. During the 1990's Kenneth Brown was President and Anthony Lake Secretary-Treasurer-Newsletter editor of IOFOS. Dr Helen James and Jane Taylor have also lectured in South East Asia as members of Forensic Odontology lecture courses. In 2005 four members from SA assisted as part of the AFP Thai Tsunami DVI Team and again in 2009 six assisted Victorian Forensic Odontologists following the Victorian bushfires.

## **New South Wales**

One of the first recorded cases involving dental identification in New South Wales was the Linda Agostini murder investigations (1934-44). Prior to the early 1980s dentists Drs Sydney Levine, Barry Barker, Norbert Wright, Max Bullus and John Wild performed body identification on an ad hoc basis for the NSW police.

Occasional circulars appeared in the ADA (NSW) Newsletter<sup>43-45</sup> requesting assistance from dentists in relation to unidentified human remains. Early in the 1960's forensic odontology was formally introduced into the 5<sup>th</sup> year dental curriculum as part of preventative and public health dentistry with Professor Peter Barnard and Drs Levine and Dale lecturing<sup>46</sup>. During this period attempts were made to formalize record keeping, requiring the full treatment status of the teeth to be included, not just that provided by the current practitioner. The introduction of denture marking was another project undertaken and it is interesting to note in 1978<sup>47</sup> a report that the Hon. D.D. Freeman, dentist and member of the NSW Legislative Council asked a question in that place of the Minister of Health as to whether he would 'consider making it mandatory in future that all dentures be marked with suitable indestructible code markings to assist where necessary in the identification of persons by forensic authorities'. He also stated 'In Government Institutions, the name of the patient is inserted in the denture under clear acrylic where possible'.

In 1981 dentist Dr Christopher Griffiths, recently retired from military service, joined Norbert Wright, then Chief Dental Officer for NSW and began the process establishing a funded forensic odontology service as part of the government health service. By 1982 a series of lectures were included for final year undergraduate students at Westmead Hospital which also incorporated a practical component. A Diploma course in Public Health Dentistry incorporating forensic odontology was available at the University of Sydney and short courses for dentists were provided by the Postgraduate Committee in Dentistry. A dental DVI team was established and a number of general dental practitioners were recruited from these courses. The first forensic dental courses were conducted for the Army Dental Reserve officers, the initial one being held at the Malabar Rifle Range with assistance from Dr Kenneth Brown and Colonel Arie van den Bos of the Royal Police of the Netherlands. Van den Bos had previously participated in the identification of deceased in the 1977 Tenerife air accident. The 2013 annual forensic dental course was the 30<sup>th</sup> organized by the NSW Forensic Dental Education Committee. The program subject matter has included forensic anthropology organized by Dr Denise Donlon, a Forensic Anthropologist with the Shellshear Museum of Sydney University. Dr Alain Middleton has been the co-coordinator since 1995 and from 2002 he has coordinated the Forensic Dental Training for Dental Assistants which is held bi-annually at Westmead Hospital. In 2003 the University of Sydney commenced a Master of Science (Dentistry) qualification. The first members to gain this qualification were Dr Paul Taylor from Tasmania and Commander Matt Blenkin of the Royal Australian Navy.

Forensic dentists were integrated into the NSW Police DVI Team in the mid-1980s and were involved in two major bus accidents in northern NSW in the same year. The first investigation relied on visual identification and resulted in one victim almost being misidentified. Following this, visual identification in NSW mass disasters was considered unacceptable. In the second accident the identification process of deceased adhered to the recently developed Interpol DVI guidelines, with odontology playing a major role. The NSW Forensic Dental Team were involved in

- 1997 Thredbo landslide in 1997 (19 died)



- 1998 Air crash in Mt Jagungal in 1998 (6 died)
- 2001 Albury car-train accident (5 died)

Internationally NSW Forensic Odontologists have been very active. In 1991 Griffiths was invited by Dr Godfrey Oettle, then Director of the NSW Institute of Forensic Medicine, to become a member of the Federal Attorney General's Special Investigation Unit (SIU) with regard to Australian War Crimes and was sent to assist in the exhumation of human remains from alleged mass graves in the Ukrainian Republic of the then Soviet Union. Soviet citizens of mainly the Jewish faith had been taken from the small village of Israelovka and been shot and buried in a mass grave approximately two kilometres from the village. The main aim of this excavation was the dental ageing of the Russian-Jewish children. Subsequently an Australian national was charged with the involvement in the death of these children. The second excavation in the Ukraine was carried out near the village of Gnivan. This was a mass grave in which many women, young girls and children were taken from the local village murdered and buried in a Soviet Army Camp which had been requisitioned by the German Army.

In 1992 Griffiths carried out a lecture tour in Indonesia, speaking at university dental schools and to local police. Included was the subject of identification in mass disasters. A similar tour in 1994 was conducted by him in Thailand and Laos and also again in Singapore and Malaysia with Professor John Hilton and Professor John Clement assisting. In 1994, as a Medical Investigator and RAAF Specialist Reservist, Griffiths assisted in the recovery of the crew of an Air Force Catalina A24-45 which had disappeared on the island of Buru in 1943. The nine crew members were recovered and identifications carried out using war time dental records. In 1995 he was made a member of the Order of Australia.

Over the next 15 years a number of recoveries were carried out of crews from RAAF aircraft lost in Papua New Guinea during WWII for the Australian Army (Kimbi, Bugali, Kewieng, Ganae and Isurava Ridge). Forensic Odontologist and Air Force Reservist, Alain Middleton was a team member.

In 1997 Clement and Griffiths were members of an international recovery team to Sumatra following the death of 104 victims of a Silk Air 737 which crashed in the river near the Indonesian City of Palembang.

In 2000 Forensic Pathologist, Dr Alan Cala and Griffiths were seconded to the United Nations Human Rights Commission to lead two teams to exhume and help with the identification of young Indonesians massacred in the Occussi enclave in East Timor (September 1999) and to develop a mortuary facility in Dili. Again in January 2001 Griffiths assisted the United Nations in identifying members of their staff killed in a helicopter accident in Mongolia close to the Russian border.

In 2002 NSW Forensic Odontologists went to Denpasar in Bali as part of the AFP team assisting with the identification of the victims of the Bali Bombing and Assoc. Professor Jane Taylor was awarded an Order of Australia Medal (OAM) for her services. In 2005 Forensic Dental Teams from NSW were involved with the AFP DVI team in Thailand following the Indian Ocean Tsunami and in Samoa following another tsunami (Middleton and Lain). Griffiths was deployed to the Congo with the AFP to assist in the identification of the victims of an air crash which involved a

number of executives from the Sundance Mining Company. Dental evidence was used in this case to exclusively identify ten out of the eleven victims. In 2012 Lain assisted the AFP with identifications of victims in an aircraft accident in eastern PNG<sup>48</sup>.

## **Western Australia**

Prior to the 1950's there was very little utilization of Forensic Dentistry services within Western Australia; if there had been, it has not been documented. Former mortuary employees have reported that during the 1950's Dr Alan Pearson in collaboration with the police undertook the majority of Forensic Pathology investigations. The case-work requiring forensic investigation was completed in conjunction with general mortuary cases at the Royal Perth Hospital mortuary, East Perth. Dr Frank Digwood, a private dental practitioner at that time and an acquaintance of Dr Alan Pearson, was called on for an occasional dental opinion.

In the early 1960's, formal positions for forensic pathologists, mortuary staff and a consultant forensic dentist were created in the State Public Health Department based at the Royal Perth Hospital mortuary. A request was made to the Australian Dental Association (WA branch) to recommend a dentist who might provide forensic services. Digwood was nominated and subsequently given the position as the state's first forensic dentist. There were occasional requests for Digwood's services but in general, forensic dentistry maintained a low profile. This however changed dramatically in 1968 with the crash of a Viscount aircraft at Port Hedland with 29 bodies being incinerated and fragmented. Forensic dentistry, coordinated by Digwood played a significant role in the formal identification process.

In 1969 forensic pathology services under the auspices of the State Public Health Department, were relocated to the present mortuary site at the Queen Elizabeth Medical Centre, Nedlands and named the State Government Laboratory Services. This name was changed to PathCentre in 1995 and renamed with its current title PathWest in 2005. All aspects of Forensic investigation services were enhanced, including forensic dentistry. A formal part-time position in forensic dentistry was created and Digwood filled the role and held that position until he became ill in 1991 and was joined by Dr. Stephen Knott who succeeded him on his death in March 1993.

During his years as a consultant forensic dentist, Digwood elevated the profile of forensic dentistry within WA liaising with forensic colleagues throughout Australia. His opinion on dental matters was often requested by the police and Coronial services and his odontology expertise was highly regarded by the courts. Digwood made a very valuable contribution to the investigation into the homicide of Michael Sideris in 1981 with his analysis of teeth found at a clandestine gravesite<sup>49</sup>. The judge at the trial before closing the hearing made the unusual comment of complimenting the forensic police officers and specifically added, "as well as the experts who assisted them in the solution of a difficult crime." Digwood was one of these experts referred to by the trial judge. In 1982, he played a significant role in the identification of victims who died in a country school bus crash at Merredin.

There were 9 deceased, the driver being the only adult. Dental data positively identified 8 of the deceased.

In 1988, an air crash at Sturt Meadows Station, near Leonora, resulted in 10 deaths. All deceased were incinerated and badly fragmented. Digwood and Knott played a primary role in their identifications. Dental data resulted in 7 victims being positively identified and gave supporting evidence for the identification of the remaining 3 victims. Following the 1988 accident, Digwood and Knott worked jointly on routine case-work amounting to 30-40 per year. This liaison continued until Digwood's death. The role of consultant Forensic Odontologist was formally transferred to Knott in 1992 and he still continues in this position with approximately 80 cases per year.

Identification is the main role of the W.A. Odontologists, the majority of cases involving remains in advanced state of decomposition or fragmentation. Approximately 23% of all cases requiring dental identifications resulted from incineration and over the last ten years opinions on dental trauma and tissue injuries have been requested. This change currently accounts for 10-15% of the annual work-load. Several cases of note have been a homicide case where identification of the victim, only possible using dental records, enabled the case to proceed, the death of an elderly lady as the result of a pack dog attack and the identification of remains following five days inside a tiger shark.

Forensic dental services are also provided to Princess Margaret Hospital (Perth's major children's hospital) and to the Sexual Assault Resources Centre (SARC). A 24hr, 7-day on-call roster to SARC is provided by Knott and assistant Forensic Odontologist Dr. Jenny Ball. In addition to case work, lectures and workshops in Forensic Odontology have been given regularly to the Major Crime Unit, Detective training and Crime Scene Investigation sections of the W.A. Police. Lectures are also given to dental students at the Dental School, University of W.A., to dental hygienists from Curtin University, to dental nurses and technicians from TAFE and to third year medical students from the University of WA. In more recent years lectures have been provided to Forensic Science students from Murdoch University and to State Government Dental Therapy centers

DVI planning and management has been an integral part of Forensic Odontology Services in W.A. A State DVI committee was formed in 1995 with Knott being the Odontology representative. The committee meets two to three times a year, reviewing recent DVI incidents and operational protocols. A formal W.A. dental DVI team was established in 2006 and now comprises 17 members (5 senior dental nurses, one of whom is a specialist dental radiologist and 12 dentists). Workshops to assist with familiarization in the Interpol DVI protocols and hands-on techniques are regularly held at the State Mortuary.

In 2002, following the October 12 bombing in Bali, an initial response team of eight personnel was deployed by the AFP to Denpasar in Bali. Knott was a forensic odontologist on that team and received an Order of Australia Medal for his services. Following the Indian Ocean Tsunami, December 2004, Knott and Ball were deployed as members of the Australian DVI team. WA Forensic

Odontologists have also participated in the DVI processes following the Victorian bush fires in 2009 and the Christmas Island refugee boat disaster December 2010 involving 30 recovered deceased.

In 2007 a Graduate Diploma in Forensic Odontology was established at the University of W.A. coordinated by Stephen Knott. Awardees up until 2013 have been:

William Burn  
Jennifer Ball  
Iris Messmer

Philip Cockerill  
Stefan Kolm  
Jitrinee Kiertiburanakul

Henry Wu

Inclusion of a Masters or a Doctor of Clinical Dentistry (Forensic Odontology) is currently being investigated<sup>50</sup>.

## Queensland

Dentist, Mr Kon Romaniuk arrived in Queensland from New Zealand in 1965 and in 1968 was appointed Consultant to the Director of Forensic Pathology. In his first year in Australia he received two cases involving forensic odontology and by 1972 had 40 cases a year<sup>51</sup>. In 1974 forensic odontology was introduced into the dental school 3<sup>rd</sup> and 5<sup>th</sup> year curriculum with two lectures provided in 3<sup>rd</sup> year and an elective in 5<sup>th</sup> year as a component of Oral Biology<sup>39</sup>. By 1982 postgraduate continuing education courses in forensic odontology were available to general dentists every second year and the University of Queensland included the subject in their Postgraduate Diploma and Master of Dental Science courses. In 1985 Dr. Alex Forrest joined Dr. Romaniuk. In 1994 he became Queensland's consultant Forensic Odontologist as a result of Romaniuk's sudden retirement following a traffic accident<sup>9</sup>. In the early 1990's forensic odontology became recognised as a useful tool in DVI and was used in identifications following

- 1994 bus crash (11 deaths)
- 1986 Moura coal mine explosion (12 deaths)
- 1996 Blackhawk helicopter crash (18 dead)
- 2000 Burketown Air Crash (8 victims)
- Marlborough Helicopter Crash (5 victims)
- 2000 Childers Backpacker Hostel fire (15 victims)
- 2002 Hamilton Island Plane Crash (6 Victims)
- 2003 Mareeba Plane Crash (5 Victims)
- 2005 Lockhart River plane crash.
- 2011 Toowoomba and Lockyer Valley Floods (21 Victims)
- 2011 Slacks Creek House Fire (11 Victims)
- 2011 Tewantin House Fire (4 Victims)
- 2012 Sunshine Coast Hinterland Plane Crash (6 Victims)

Forensic Odontology enjoys the same status in Queensland as both of the other major Interpol recognised primary identifiers, DNA and Fingerprints, with a high success rate that is well recognised.

Forrest moved from teaching Oral Biology at the University of Queensland Dental School to the School of Biomolecular and Physical Sciences at Griffith University, where he is currently in charge of the Forensic Science program. He is an Associate Professor in Forensic Science and has been involved in many areas of Forensic Odontology. He has been Secretary of AuSFO, carries out case work for the State Coroner, provides assistance to the police and has carried out research at Griffith University on numerous forensic topics. He has lectured locally, at interstate postgraduate courses and nationally and has been a member of forensic odontology lecturing tours to South East Asia. He has also participated in the DVI processes in Indonesia following the first Bali Terrorist Bombing, as a DVI team leader, assisted by Queensland odontologist Marie Wilson and Paul Matussi, in Thailand (2005) following the Indian Ocean Tsunami and was a team member during the Victorian bushfire DVI process. He has assisted in the DVI odontology processes after the Kokoda Plane Crash in Papua New Guinea (2009) and the Samoan Tsunami in 2009.

In 2000, Forrest was principal forensic expert witness in *R v CARROLL* (2000), a case in which the major forensic odontology evidence related to bite marks, and which resulted in changes to the "Double Jeopardy" rule in all Australian States.

In 2009, Queensland Forensic and Scientific Services acquired a CT Scanner, which is now routinely used in all forensic odontology cases conducted at the Centre. Odontologists perform casework in pairs, reviewing and cross-checking every aspect of each case undertaken.

Currently the Forensic and Scientific Services in Queensland has two Forensic Odontologists, Drs Forrest and Henry Wu. Brad Ross is currently studying for specialist registration, and Alistair Soon has recently joined the team as its newest member on a casual basis. A number of general dental practitioners from across regional Queensland have been credentialed by the Queensland Department of Health, in consultation with local Forensic Odontologists, to perform limited forensic odontology services under specialist supervision at Queensland Forensic and Scientific Services<sup>52</sup>.

## **Tasmania**

Prior to 1989 Tasmanian cases that required dental investigation were handled by, Eric Canning M.B.E., a senior Hobart dentist and the honorary oral surgeon to Royal Hobart Hospital for many years. In 1989 Dr Paul Taylor, a local dentist who had recently completed a forensic odontology course in NSW replaced Dr Canning. The Tasmanian police readily accepted his help and every few months would present him with a skull or bones which he would take to his practice for examination. Eventually Taylor was asked by the Tasmanian Department of Forensic Pathology if he would be prepared to go to the mortuary to examine "wet" remains. In these first couple of years there was no exclusivity and the mortuary technician would sometimes ask his own dentist or the missing person's practitioner to perform the examination of the remains. Elsewhere in the State police would ask "a dentist" to assist if they felt it was needed. Gradually Forensic Pathology and Odontology services became centred in Hobart.

In April 1996 the first DVI Committee meeting was held at the Police Centre in Hobart. Within weeks there was a mass shooting at Port Arthur and Taylor along with an employee dentist in his practice, Marie Wilson, went to the scene where three bodies had been incinerated in the Seascope Cottage following the shooting<sup>53</sup>. Professor J. Clement, a highly experienced forensic odontologist from Melbourne visited briefly to provide specialist support.

Following this event Taylor was appointed as the State Forensic Odontologist and Dr. Marie Wilson assisted in much of the local casework until she left the State in 2004. In October 2002, following the terrorist bombing in Bali, Taylor and Wilson joined the participating Australian Forensic Odontology DVI Team. At that time Forensic Odontology services in Tasmania and in Bali were provided pro bono. Taylor, Wilson and other Bali DVI team members received the Australian (OAM) award in recognition of services provided.

Shortly after returning from Bali Taylor was contracted and paid per case at an hourly rate. This was basically to offset private practice expenses incurred. During his tenure Taylor has attended National DVI, Specialist Advisory Group and Australia Society of Forensic Odontology meetings, was involved in the Thai Tsunami DVI and participated with the RAAF Reserve team that excavated skeletal remains of two Australian MIAs from a crashed Canberra Bomber in Quang Nam in Vietnam in 2009.

Dr. Patrick Oxbrough, a general dental practitioner, has also been involved in Tasmanian casework since the mid 90's and acts as Taylor's deputy when he is away carrying out some of the day to day casework on an hourly rate. He is also involved in the local DVI committee. Taylor has appeared in the Supreme Court on several occasions as an expert witness in murder trials and Wilson appeared on one occasion. Cases have included bite marks with scene attendances involving clandestine graves and fire deaths, some of which were homicides. Taylor has been consulted by police on many technical matters from fingerprints to surveillance and has investigated various complaints and incidents involving sworn officers.

Forensic odontology training is provided at the Police Academy for recruits, detectives and DVI officers and forensic odontology input is provided in desktop and practical scene training for police and at DVI and Coronial Plan meetings. A close cooperative environment now exists between forensic odontology, the Coroner, Police and Forensic Pathology<sup>54</sup>.

## **Northern Territory**

Early forensic odontology services were believed to have been performed by Mr T. Paul Boyd<sup>9</sup>, a part time oral surgeon in the government health service. In the late 1970's Katherine government dentist, Dr John Plummer was asked to identify a family who had drowned in a local flash flood and following gaining overseas forensic odontology experience on a Churchill Fellowship in 1985 Plummer continued providing forensic odontology services pro bono before retiring in 2002. A Darwin Orthodontist, Dr Mark Leedham succeeded him and now provides this service when

requested. He also lectures at the NT Police Detective Training course and has approximately 10 cases a year with Forensic Odontologist, John Plummer, available if required<sup>55</sup>.

Notable events that have involved dental identification include

- 1974 Cyclone Tracy
- 1989 Alice Springs collision of two hot air balloons (13 died)
- 2008 Pine Creek light plane crash (2 died)
- 2009 Ashmore Reef asylum seeker boat explosion (3 died).

### **Australian Capital Territory**

Prior to 1990 there was no formal forensic odontology service offered in the ACT. In the rare event of the AFP needing to seek dental advice they tended to contact their family dentist and ask for help. After a particularly nasty murder which went unsolved for several months because of a failure in the identification process, Dr David Griffith a resident dentist, undertook a short course in forensic odontology and started to offer this service to the ACT region of the AFP. Forensic odontology had a slow start, however the National branch of the AFP were persuaded to include it as part of their certificate in Crime Scene Examination and Griffith was invited to teach a component of that course. Following the crash of a MIG 15 aircraft in Canberra forensic odontology services were put on a more formal footing and the ACT Forensic Dental Unit was established in 1991 and still is operational.

The AFP Rescue squad commenced DVI training in 1992 and included a forensic odontology component with Griffith as lecturer. This course expanded significantly and became a part of the AFP's Law Enforcement Co-operation Program and Griffith became a member of a lecturing team of Forensic Odontologists from around Australia delivering advanced DVI training to the national arm of the AFP and to any country in SE Asia that wished it. Courses were conducted by this team in Cambodia, Thailand, Singapore, Sri Lanka, Vanuatu, Philippines, Indonesia, Solomon Islands and Vietnam and this was all pro bono. These courses are still being conducted with the most recent in Indonesia in mid-2012.

The ACT Forensic Dental Unit is unfunded and all staff work is carried out pro bono. The current staff consists of two fully qualified specialist Forensic Odontologists Drs D. Griffith and S. Chiam and two specifically trained Dental Assistants.

In the early days Griffith provided all his own equipment but as the acceptance and reliance on forensic odontology by the Coroner's Office grew a Nomad portable X-ray generator and all the equipment for overseas deployments were provided. Currently, forensic odontology lectures are presented at the Australian National University (ANU), Canberra Institute of Technology (CIT), University of Canberra, AFP DVI courses for the ACT region and National branches, the AFP (ACT) Detectives course, the Sexual Assault Course and Health Directorate staff. The AFP DVI courses are conducted bi-annually and the aim is to have every AFP member nationally trained in DVI. Short refresher courses are also being conducted. The two

most significant events involving forensic odontology in the ACT were the MIG 15 air-crash in 1991 and the Canberra bushfires in 2007<sup>56</sup>.

### **Collaboration through the Australian Society of Forensic Odontology**

The Australian Society of Forensic Odontology Inc. (AuSFO) was established in 1983, as the Australian Society of Forensic Dentistry. Its objectives are to:

- advance the study of forensic odontology and its application to the law;
- advance the science of forensic odontology and promote practice standards;
- to promote high quality and timely forensic odontology services to assist the Australian Coronial and Justice systems;
- maintain a roster of forensic odontologists who are available to deploy to mass disasters as required by relevant authorities;
- act as a conduit for forensic odontology deployments in mass disasters<sup>57</sup>.

AuSFO is a society open to any dental professional of good standing with an interest in forensic odontology. It has no legislative or administrative function, but aims to represent forensic odontologists in their interactions with stakeholders. In this context it is the overarching body facilitating the involvement of member forensic odontologists in DVI, both nationally and internationally. Its code of ethics is modelled on that of the Australian and New Zealand Forensic Science Society (ANZFSS).

The Australian Society of Forensic Dentistry was first proposed by Kenneth Brown in 1976 following his visit to Scandinavia on a Churchill Scholarship. On his return to Adelaide he suggested that a society could be established in Australia to improve the image of forensic odontology and ultimately have it recognized by the dental and legal profession and police as a formal specialist area of dentistry. Anthony Lake prepared a draft constitution for distribution. Discussion on matters such as provision for non-Australian members, non-dentist members, use of “Odontology” or “Dentistry” in the title and affiliation with the Australian Dental Association (ADA) and the International Organization of Forensic Odonto-Stomatology (IOFOS) ensued and an interim committee was established in 1981. Members of that committee consisted of Drs K. Brown, A. Lake, R. Bastiaan, F. Digwood, J. Plummer, S. Levine, K. Romeniuk and M. Churton from New Zealand. Material assistance to that committee was also provided by the Hon. D. Freeman and Drs H. Orams, G. Bellamy, G. Dalitz and several members of the Scandinavian Society of Forensic Odontology.

The Inaugural Meeting of the Society was held on May 4<sup>th</sup> 1982 in Perth during the ADA Congress. The foundation membership was 63. Initial goals of the Society were to set recommended standards of practice for members, encourage improved record keeping within the profession, attempt to have denture marking as a mandatory requirement nationally, affiliate with IOFOS and the ADA, incorporate as an association and coordinate the dissemination of research information in forensic odontology in Australia. At that time, a highly publicized disaster helped spur the



society's progress. In 1979 an Air New Zealand DC10 aircraft on a New Zealand "internal" round-trip scenic flight to Antarctica crashed and burned on Mt Erebus killing 257 people. The controversial Mahon Royal Commission of Enquiry, an ABC 4 Corners documentary and the international nature of the disaster close to Australia attracted a great deal of attention. Within the forensic odontology community the innovative scientific approach using grid referencing at the scene and the high number of dental identifications provided further impetus for forensic odontology DVI research<sup>58-60</sup>.

In 1983 the Society incorporated in the A.C.T., indicating its national status, and Dr N. Egan a resident dentist in the ACT, accepted the position of Public Officer. Affiliation was not achieved with either IOFOS or the ADA. The ADA required all members of the Society to be ADA members which proved to be impossible, and IOFOS membership at that time was on an individual basis. When IOFOS amended its constitution to have member countries rather than individuals as members, the Australian Society of Forensic Dentistry became an affiliate. Currently affiliation with the ADA is being investigated following easing of ADA Constitutional requirements. Several projects were initiated in those early years. In 1982 electronic databases were very limited and the biomedical database at that time, Medline, had only a very small forensic odontology coverage starting from 1965. Using the newly available personal computers, Professor T. Solheim, a Norwegian Forensic Odontologist, and Dr. A. Lake of South Australia, initiated an electronic literature database in forensic odontology which the Australian Society of Forensic Dentistry endorsed. Collection of data continued until the project was made obsolete by the large commercial databases we know today. Another exercise of particular note was the lobbying of Dental Schools and Boards to make recording of previous treatment standard practice when documenting the dentition's status on case notes. Many supported the idea "in principle" but not necessarily in practice. Recently, with the creation of the Dental Board of Australia, requirements for record keeping have been standardized and guidelines set, which go a considerable way towards reaching that goal<sup>61</sup>. Encouraging denture-marking of all new dentures was another early project of the Society. Workshops were held at the Australian Dental Standards Laboratory in Melbourne under the supervision of Assistant Director Associate Professor Martin Tyas, and several marking methods were ultimately recommended to dental schools and dental technician training institutions. This met with little long-term success.

Society meetings continued to be held at ADA congresses for a number of years with AGMs conducted at other times by mail. One meeting was held during the International Association of Forensic Science (IAFS) conference in Adelaide in 1990 and in more recent times these have been held jointly with Australian New Zealand Forensic Science Society symposia.

In 2002 and again in 2005 Society members were involved in Operation Alliance and Affinity (the Bali Bombings DVI investigations)<sup>62</sup>. In 2005 the Society managed the Australian Federal Police odontology response following the Thai Tsunami. The co-ordinators at the time were President Dr. Stephen Knott and V-President Dr David Griffith. These events have helped create a highly skilled team of Australian forensic odontology experts and their experiences have provided the basis of the Society DVI manual now in use<sup>63-68</sup>.

In October 2011 the Society held its first national symposium in Darwin (Dr Mark Leedham convenor). This was well supported by members of the New Zealand Society of Forensic Odontology to which AuSFO has close ties.

On the 1<sup>st</sup> July 2010 Forensic Odontology in Australia reached its age of maturity with the staged introduction of the Australian Health Practitioner Regulation National Law Act 2009 (The National Law)<sup>69</sup> and the incorporation of Forensic Odontology into the List of specialties in the Profession of Dentistry by the Dental Board of Australia<sup>2</sup>. Up until that date only the New South Wales and Tasmanian Dental Boards officially recognised this area of dentistry as a specialized field<sup>70</sup>

Since then, members of the Society have also been active on a broader stage representing Australian Forensic Odontology on a Federal Government Medical Sciences Specialist Advisory Group (2012 rep. Dr Anthony Hill)<sup>71</sup>, the Australian New Zealand DVI Committee<sup>72</sup> ADVIC (Dr Jane Taylor) and on the Interpol Standing Committee on Disaster Victim Identification (rep. Dr Alain Middleton).

Following the establishment of a national forensic odontology specialist's register by the Dental Board of Australia ties were created with The Royal College of Pathologists of Australasia. The formation of a Forensic Odontology section within the faculty of Oral and Maxillofacial Pathology of the College was cemented with the induction of the founding forensic odontologists on February 23, 2013. Those attaining membership on that occasion were:

Mr Norman Arthur Firth	Dr James Francis Goodrich	Dr Mark David Leedham
Dr Stephen Knott	Dr Jeremy Peter Graham	Dr Ka Kui Carl Leung
Dr Russell Lain	Prof Christopher John Griffiths, AM	Dr Alain Guy Middleton
Dr Anthony J Hill	RFD	Ms Susan Middleton
A/Prof Alex Forrest	Dr David Gwyn Griffiths	Mr Bruce Murdoch
Dr Richard Bruce Bassed	Dr Judith Anne Hinchliffe	Prof Phrabhakaran Nambiar
Dr David Maxwell Antunovic	Dr Helen James	A/Prof Jane Amelia Taylor
Dr Jennifer Anne Ball	Dr Zafer Khouri	Dr Paul Terence Girot Taylor
Dr Matthew Robert Barclay Blenkin	Prof Julius August Kieser	Mr Hugh Gourlay Trengrove
Prof John Gerald Clement	Dr Wayne Robert Earl Laing	Dr Pamela Jane Gower

## References

1. Cary E. Dio's Roman History London:William Heinemann 1925 Vol 8 Book 61 17
2. Hill IR, Keiser-Nielsen S, Vermeylen Y, Free E, de Valck E, Tormans E ed. Forensic Odontology Its Scope and History Oxon 1984
3. Luntz LL. History of Forensic Dentistry Dental Clinics of North America 1977 21(1) 7-17
4. Harvey W, Simpson K. Dental Identification & Forensic Odontology London:Henry Kimpton 1976 1-6
5. Sullivan R. The Disappearance of Dr Parkman Boston:Little Brown & Co 1971
6. Hill IR, Keiser-Nielsen S, Vermeylen Y, Free E, de Valck E, Tormans E ed. Forensic Odontology Its Scope and History Oxon 1984 14-16
7. Amoëdo O. L'Art Dentaire en Médecine Légale Paris:Masson et Cie

8. Amoëdo O. Identification of bodies by the expert dentist. *Dent Cosmos* 1899 41(5) 444-449
9. Taylor J. A Brief History of Forensic Odontology and Disaster Victim Identification Practices in Australia *Forensic Odontostomatol.* 2009 Dec 27(2) 64-74
10. Sognaes R, Strøm F. The odontological identification of Adolf Hitler, Definitive documentation of x-rays, interrogations and autopsy findings *Acta odont Scand* 1973 31(1) 43-69
11. Hill IR, Keiser-Nielsen S, Vermylen Y, Free E, de Valck E, Tormans E ed. *Forensic Odontology Its Scope and History* Oxon 1984 185-192
12. Hill IR, Keiser-Nielsen S, Vermylen Y, Free E, de Valck E, Tormans E ed. *Forensic Odontology Its Scope and History* Oxon 1984 227-239
13. Sprague WG Introduction, International Conference on Forensic Dentistry *Proc Int Conf Forens Dent ADA/FDI* 1969 Oct 13 1-3
14. IOFOS Newsletter 1982 4(1) 5
15. Boyers RC Organization of the Specialty *J Leg Med* 1971 6(4)
16. Brown K. Vale-Gösta Gustafson *Forensic Odontostomatol.* 2002; 1
17. Gustafson G. *Forensic Odontology.* London:Staples Press,1966
18. Dental Board of Australia List of Specialties, <http://www.dentalboard.gov.au/Registration/Specialist-Registration.aspx> (Accessed 16 December 2012)
19. Page M. A legal, scientific and phenomenological enquiry into the reliability of bitemark analysis, 2012 Thesis for Doctor of Philosophy
20. Evans W. Age estimation from the teeth using a modified Demirjian system, *J Forensic Sci.* 2010 55 1504-8
21. Taylor J. Development of the Australian Society of Forensic Odontology Disaster Victim Identification *Forensic Odontology Guide,* *Forensic Odontostomatol.* 2009 27(2) 56-63
22. Clement JG, Marks MK. *Computer-Graphic Facial Reconstruction* Burlington USA Elsevier Academic Press, 2005
23. Al-Amad S, McCullough J, Graham J, Clement J, Hill A. Craniofacial identification by computer-mediated superimposition *Forensic Odontostomatol.* 2006 24(2) 47-52
24. Brown KA. Forensic Odontologist (retired) South Australia. Personal communication
25. Digwood F. Forensic Odontologist (deceased) Western Australia Personal Communication 1982
26. Brown KA. The Identification of Linda Agostini. The Significance of Dental Evidence in the Albury 'Pyjama Girl' Case *Forens Sci Int* 1982 20 81-86
27. Morton J, Flach R. The Morgan-Agostini case *Criminologist* 1969 4 (14) 89-103
28. Delaney CJ. Commissioner of police, Police Department, Sydney ADA (NSW) Newsletter 1959 2 Insert
29. Homicide Squad, South Australian Police Department ADA (SA) Newsletter September 1964 Insert
30. Bastiaan RJ Dental identification of the Victorian bushfire victims *Aust Dent J* 1984 29(2) 105-110
31. Danielsen K Ed. News from Australia *Scand Soc Forens Odont Newsletter* 1972 6 210-211
32. Hill IR, Keiser-Nielsen S, Vermylen Y, Free E, de Valck E, Tormans E ed. *Forensic Odontology Its Scope and History* Oxon:Hill IR 1984 103-110
33. Hill Anthony Forensic Odontologist Victoria Personal communication 2013
34. ADA (SA) Newsletter March 1961 pg1
35. ADA (SA) Newsletter May1965 pg5

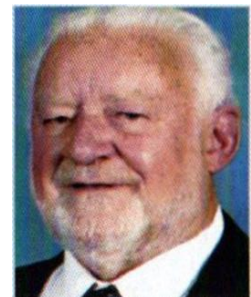
36. ADA (SA) Newsletter June 1967 pg3
37. ADA (SA) Newsletter July 1967 pg3
38. Hill IR, Keiser-Nielsen S, Vermynen Y, Free E, de Valck E, Tormans E ed. Forensic Odontology Its Scope and History Oxon 1984 103-110
39. Brown K. The Truro Murders in Retrospect: a Historical Review of the Identification of Victims Annals Academy Med 1993 22 (1) 103-106
40. Brown K. The role of forensic odontology in the Azaria Chamberlain case The Dental Annual 1986 D Derreck (Ed) Bristol:John Wright & Sons 42-54
41. Brown K., Taylor J., Macdonald M., Szuster F. How old is Abdul? A cautionary tale for forensic odontologists involved in age identification 1998 6<sup>th</sup> Indo Pacific Congress on Legal Medicine and Forensic Sciences Kobe Japan July 1998 1-3
42. Pounder DJ. The 1983 South Australian Bushfire Disaster Am J Forens Med Pathol 1985 6 77-92
43. Delaney CJ Commissioner NSW Police Special Circular ADA (NSW) Newsletter 1959 2 Insert
44. Fergusson DJ NSW CIB Unidentified Male Person ADA (NSW) Newsletter 1969 18(9) Supplement
45. Criminal Investigation Branch Sydney NSW ADA(NSW) Newsletter 1969 18(9) Special Circular 13
46. Levine S. University of Sydney NSW Personal communication 1982
47. ADA (NSW) Newsletter May 1978 p7
48. Griffiths C. Forensic Odontologist NSW Personal communication January 2013
49. Zanetti F Investigations into the killing of Michael John Sideris Australian Police Journal – 1985 39(3) 85-95
50. Knott S. Forensic Odontologist Western Australia Personal communication January 2013
51. Keiser-Nielsen S. Australian Scene I.O.F.O.S Newsletter 1982 4(1) 5
52. Forrest A. Forensic Odontologist Queensland Personal communication January 2013
53. Taylor PTG, Wilson ME, and Lyons TJ. 2002. Forensic odontology lessons: Multi-shooting incident at Port Arthur, Tasmania. Forensic Science International 130(2-3) 174-182
54. Taylor P. Forensic Odontologist Tasmania. Personal communication December 2012
55. Leedham M. Forensic Odontologist Northern Territory. Personal communication January 2013
56. Griffith D. Forensic Odontologist ACT. Personal communication 2013
57. Australian Society of Forensic Odontology website <http://www.ausfo.com.au/> Accessed December 2012
58. Parker D. Application of Forensic Odontology in Aircraft Accident Investigation” <ses.library.usyd.edu.au/bitstream/2123/4866/1/0152.pdf> Accessed December 2012
59. Cairns FJ, Herdson PB, Hitchcock GC, Koelmeyer TD, Smeeton WM, Synek BJ. Air crash on Mount Erebus Med Sci Law 1981 21(3) 184-188
60. Pert DI. Dental aspects of the Mt Erebus disaster NZ Dent J 1980 76(346) 187-193
61. Dental Board of Australia Dental Board- Guidelines on Dental Records [www.dentalboard.gov.au](http://www.dentalboard.gov.au) Accessed December 2012
62. Lain R., Griffiths C., Hilton JMN Forensic dental and medical response to the Bali bombing A personal perspective MJA 2003 179(7) 362-365
63. Australian Society of Forensic Odontology Disaster Victim Identification- Forensic Odontology Guide Version 3 February 2012

64. James H. Thai Tsunami victim identification – overview to date *Forensic Odontostomatol.* 2005 23(1) 1-18
65. Berketa JW James H Lake AW. Forensic odontology involvement in disaster victim identification *Forensic Sci Med Pathol* 2012 8(2) 146-156
- 66 Lake AW, James H. Berketa JW Disaster victim identification: quality management from an odontology perspective *Forensic Sci Med Pathol* 2012 8(2) 157-163
67. Hill A. Hewson I Lain R. The role of the forensic odontologist in disaster victim identification: lessons for management *Forensic Sci Int* 2011 205 33-47
68. Basset R. Leditschke J Forensic medical lessons learned from the Victorian Bushfire disaster: recommendations from the phase 5 debrief. *Forensic Sci Int* 2011 205(1-3) 73-76
69. Australian Health Practitioner Regulation National Law Act 2009 , <http://www.cotrb.com.au/FrequentlyAskedQuestions.pdf> Accessed 16 December 2012
70. Meeting-of-the-Dental-Board-of-Australia—29-October-2010.pdf [www.dentalboard.gov.au/News/Communiqués.aspx](http://www.dentalboard.gov.au/News/Communiqués.aspx) Accessed December 2012 transition
71. Criteria for the Specialist Advisory Groups 2012 [www.dentalboard.gov.au/.../default.aspx?record=WD10%2F1398&dbid=AP&chksum=lkenNC8OCIXJA96kR0OfqA%3D%3D](http://www.dentalboard.gov.au/.../default.aspx?record=WD10%2F1398&dbid=AP&chksum=lkenNC8OCIXJA96kR0OfqA%3D%3D) Accessed December 2012
72. ADVIC Committee 2011 July [www.anzpaa.org.au/resources-and-links/disaster-victim-identification/advic-committee](http://www.anzpaa.org.au/resources-and-links/disaster-victim-identification/advic-committee) Accessed December 2012
73. Hill A. Australian Society of Forensic Odontology Darwin Symposium Program 2011

## Australian Founding Fathers

### Dr. Gerald David Dalitz BDS<sub>c</sub>, MDS<sub>c</sub>.

Dr Dalitz was born on 6-3-1927, educated at Scotch College, Melbourne, gained his degree— Bachelor Dental Science (Melb) — in 1948 and his Master of Dental Science (Orthodontics and Oral Pathology) in 1955.



In the early fifties Dalitz became interested in the relatively unknown subject of Forensic Odontology. He was introduced to the Victorian Government Pathologist, Dr. Keith Bowden, who became his mentor during the time of his research. In 1958 he made a formal application to present his thesis entitled "A study of some forensic aspects of Dental Science with special reference to the identification of human remains". His degree was conferred in 1962.

During the 60's and 70's, craniofacial superimposition was an innovative method used for identification purposes and Dalitz initiated both photographic and later video techniques to enhance human identification processes. He accompanied a police member during an overseas program to instruct and advise on the use of "photo-fit" identification procedures. For many years Dalitz was the only Victorian dentist working in the field of Forensic Odontology and human identification.

Dalitz's list of society memberships , affiliations and consultancies is extensive .To list but a few: Australian Dental Association, British Academy of Forensic Science, Inaugural fellow of the FRACDS, Australian Society of Orthodontists,

International Association of Forensic Science, consultant to Royal Australian Air Force and Department of Civil Aviation. The Australian Society of Forensic Odontology bestowed an Honorary Life Membership to Dalitz with citation: "In recognition of a lifetime of contribution to forensic dentistry and the community"<sup>73</sup>.

### **Dr Kenneth Aylesbury Brown, AM, BDS, DSc.**

Dr Brown was educated at Adelaide Boys High and then the University of Adelaide, graduating in 1950. Brown's knowledge of using dentistry as a means of identification was initially sparked when he was a child: his dentist father was called to the city mortuary to "recognize gold inlays he had placed in the (train accident victim's) mouth".



Whilst in private practice in Walkerville, in 1961 he attended a lecture arranged by the Dental Board of SA and the Law Society, given by Prof. Gösta Gustafson. During the presentation, Gustafson described his role in identifying the victims of the attempted assassination of Adolph Hitler towards the end of WW2.

In 1967 Brown joined the SA Branch of the Forensic Science Society — the only odontologist in that group. Shortly after the police brought post-mortem material to his private practice.

In 1973, following his submission to the Criminal Law and Penal Methods Reform Committee, recommendations in the Mitchell Report suggested the establishment of a Forensic Odontology unit at the Dental School be established. Funding was finally made available in 1979. Brown was the first Director of the Forensic Odontology Unit at the University of Adelaide from 1980 until his retirement in 2000.

In 1976, Brown was awarded a Churchill Fellowship in Forensic Odontology, enabling him to travel to Europe and Japan.

He was appointed a Member of the Order of Australia in 2006. Other recognitions and appointments include: Past president of the Australia Japan Association, visiting lecturer at the Tokyo Dental College (19986-1990) and part-time Assistant Professor from 1991. Brown was instrumental in setting up a sister relationship between The University of Adelaide and Tokyo Dental College in 1986.

Brown has published extensively in refereed journals, has been editor of the Journal of Medicine and the Law (1977) and on the board of the Journal of Forensic Odonto-Stomatology since 1982.

He has been a member of 12 national and international societies of forensic odontology, was president of the Forensic Science Society (SA Branch) in 1980-81 and was president of the International Organization of Forensic Odonto-Stomatology from 1984-1990.

Brown was twice chairman of the forensic odontology section of the International Association of Forensic Science conventions (Oxford 1984 and Vancouver 1987) and secretary of the Adelaide convention (1990). He has been invited to lecture on aspects of forensic dentistry in 17 overseas countries.