

CHAPTER

1

1.1 Introduction to Forensic Odonto-Stomatology, and IOFOS

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1.2 History of Forensic Odonto-Stomatology

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1.1

Introduction to Forensic Odonto-Stomatology, and IOFOS

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Forensic odonto-stomatology is a small but very significant, multidisciplinary field comprising odontology and medicine from the natural sciences, and law from the social sciences, Fig. 1.1.

A world-renowned dental anthropologist, Kurt Alt, has ranked forensic odontology among the twelve basic segments in the field of dental anthropology, Fig. 1.2.

The Federation Dentaire Internationale (FDI) has been responsible for the international promotion of forensic odonto-stomatology since 1968, and it has included this area of dentistry in all FDI activities.

On the recommendation of the FDI, forensic odonto-stomatology is listed as a stand-alone course in the curricula of dental schools around the world, and students of major dental schools acquire some knowledge and skills in the field of forensic odonto-stomatology.

It was this beginning in the 1970s that led to the popularisation of forensic odonto-stomatology in colleges and started the research activities of teachers and students in the field.

From its earliest days, forensic odonto-stomatology has been divided into four basic areas:

1. Dental identification of human remains, or of unidentified living people

2. Analysis of bite marks on victims' bodies, in an attempt to identify the perpetrator
3. The examination and evaluation of dental injuries in criminal and civil litigation
4. The determination of dental malpractice

Mass disasters around the world are frequent: natural disasters, traffic accidents, terrorism, and wars, for instance. The knowledge and skills of experts in forensic odonto-stomatology are much in demand.

As new forensic procedures seek to establish themselves as the gold standard, teeth remain,

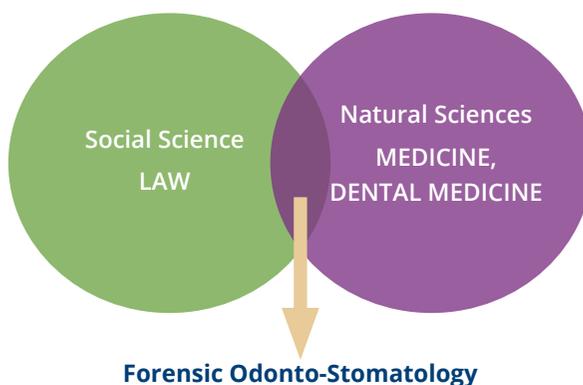


Fig. 1.1 Forensic Odonto-Stomatology

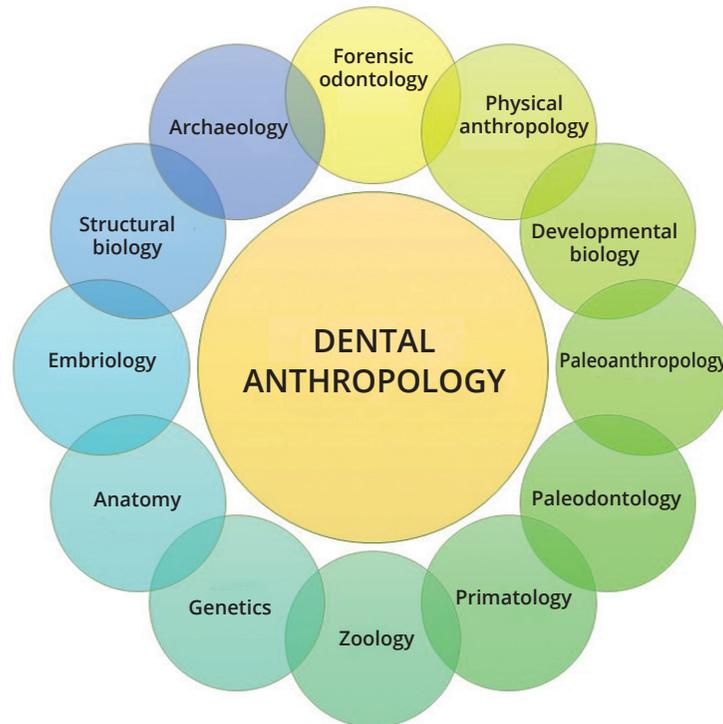


Fig. 1.2 Forensic odontology as a scientific discipline in the spectrum of dental anthropology

Table 1.1 IOFOS presidents

PRESIDENT	YEARS	COUNTRY
Gösta Gustafson	1973-1975	Sweden
Reidar Sognnæs	1975-1978	Norway/United States
Sören Keiser-Nielsen	1978-1981	Denmark
Ian Hill	1981-1984	United Kingdom
Kenneth Brown	1984-1990	Australia
Klaus Rötzscher	1990-1996	Germany
Håkan Mörnstad	1996-1999	Sweden
Eddy de Valck	1999-2002	Belgium
Tore Solheim	2002-2005	Norway
Herman Bernitz	2005-2011	South Africa
Vilma Pinchi	2011-2017	Italy
Hrvoje Brkić	2017-2023	Croatia

according to Interpol, the fastest and cheapest method for establishing identity.

A few years after the FDI's decision to recognise forensic odonto-stomatology as a new field,

the pioneers met to organise themselves as the International Organisation for Forensic Odonto-Stomatology (IOFOS). They have decided to use well-defined, deliberate ways of working that are well-aligned with the objectives. They elected Professor Gösta Gustafson from the University of Gothenburg, Sweden, as first president (Table 1.1, Fig. 1.3, Fig. 1.4).

Over the past half-century, IOFOS has prospered and grown into a strong international organisation with clearly defined goals:

- To provide a global liaison between societies of forensic odontology
- To promote goodwill, advancement, and research in forensic odontology.
- To publish a newsletter on a regular basis.

With these goals, IOFOS has published the *Journal of Forensic Odonto-Stomatology* (JFOS). Since 2017, IOFOS has organised major international conferences, held independently around the world, under its patronage.



Fig. 1.3 IOFOS official logo



Fig. 1.4 The official IOFOS chain with names of the previous presidents

The future of forensic odonto-stomatology is assured, as human teeth remain the most commonly preserved tissue of the human body, and evidence of dental interventions remains permanently. Forensic odonto-stomatology is continually evolving, with the development of new techniques through the study of dental materials and implants, and in the implementation of computer-based acquisition, documentation, and dissemination of evidence. In the rehabilitation of teeth and dental tissues, and through the use of IT in the daily work. Quality assurance in the implementation of procedures and facts based on scientific evidence are extremely important in the field of Forensic odonto-stomatology.

In order to keep up with the times, we need to keep up to date. We need to learn and repeat, and apart from workshops, lectures, conferences - written data and new books and university textbooks used in higher education have become the main source of knowledge transfer to our students, colleagues, and to all people who are interested in Forensic odonto-stomatology.

1.2

History of Forensic Odontology

Eddy de Valck

Today, forensic odontology is generally accepted as one of the primary identification methods for unidentified bodies, because of its reliability and sound scientific standing. However, methods developed and used in the past would most likely not withstand the scrutiny of the various legal systems today, as a scientific approach and quality assurance have become the most important issues in identification cases. In the past, identification has not been only by means of teeth. Some of the cases described in the literature dealt with bite mark investigation and dental age estimation, based on the sound scientific knowledge and experience of odontologists or pathologists.

Without history, there would be no present or future, and although methods have evolved into a more scientific approach, it was only recently that the discipline of forensic odontology has gained a scientific status, being considered an independent valuable discipline in the field of forensic sciences.

This chapter presents an overview of historical cases from around the world, to illustrate the different kinds of case to which dental experts have been exposed in the past and which are quite similar to those of today. The biggest difference lies in the fact that odontologists or medical examin-

ers who acted as experts in these historical cases were not 'specialists' in forensic odontology but rather people with a particular interest in human identification.

Although some cases of major disasters mention forensic odontology as the prime identification method, The fire at the Bazar de la Charité in Paris on May 4, 1897 may be considered for the first use of forensic odontology in mass disasters.

Dr Oscar Amoedo, a Cuban dentist working in Paris at the time of the fire, is often considered the father of forensic odontology after publishing his thesis 'L'art dentaire en Médecine légale'. In fact, he did not perform any forensic dental work at the incident but described in his book techniques for using teeth and dental records as a reliable source in the identification of the victims of this catastrophe.

From then on, other authors started to publish reports on the use of odontology in forensic cases, which emphasised the importance of the dentition and teeth in identification cases and other applications.

IOFOS was founded as the International Society of Forensic Odonto-Stomatology (ISFOS) at

a meeting in Paris in June 1973, with Professor Gösta Gustafson of Malmö (Sweden) being nominated as its first President. A complimentary newsletter had been sent out to a number of colleagues, dental schools, and others believed to be interested in Forensic Odontology and willing to support the efforts of those, promoting forensic odonto-stomatology as a new science, by Soren Keiser Nielsen (Denmark), President at that time. Membership was by individuals in that beginning period.

After the General Assembly of June 1981 in Bergen, membership was changed from individual memberships, to society membership only, as the organisation became more organised and structured. At the same meeting, the Society became an Organisation and the name changed to IOFOS. In 1984, the organisation comprised 219 members, originating from 22 countries, over 4 continents.

IOFOS became more prominent as forensic odontology developed as a science. Links were forged with important world organisations such as FDI, WHO, Interpol, and ICRC, and forensic odontologists established partnership in forensic investigations of all kinds. Scientific research in forensic odontology, courses in the discipline and training at different levels, helped our specialism to gain the respect and credibility that it deserves.

Today, forensic odontology is universally recognised as one of the reliable forensic sciences and as one of the primary identification methods in DVI.

As the official representative of the forensic odontology community, IOFOS is an expanding organisation advancing its initial goals, as formulated in 1973.

Although some mention that the Adam and Eve story and the bite in the apple is the oldest case of forensic odontology known, there is no written report of it.

1.2.1 Head on the plate

(Lollia Paulina)

The oldest known written report of recognition by teeth is found in a book by the Greek historian, Dio Cassius, who spent most of his life in Rome. In his 80-volume 'Roman History', published in AD 49, he describes how Agrippina, the wife of Emperor Claudius, had an old rival, Lollia Paulina, assassinated by her soldiers, so that her son Nero could become emperor.

'She did not recognise the woman's distorted face when it was brought to her, then she opened the mouth with her own hand and inspected the teeth, which had certain particularities, with her fingers.'

It was not an unusual custom in those days to bring the head of a defeated enemy, back from battle, not only for proof of death but also for recognition.

1.2.2 Charles the Bold

(1477)

Charles the Bold, born in 1433 in Dijon, France, son of Philip The Good, Duke of Burgundy, and Isabel of Portugal, succeeded his father in 1467. He inherited Burgundy, the present Luxemburg, Belgium, and the southern Netherlands, and soon became a political and military threat to the German Roman emperor Friedrich III, because Charles had territorial ambitions, to create a kingdom of Burgundy. After Charles conquered Lorraine in 1473 and was about to be proclaimed King of the Romans, Friedrich responded by sending a well-trained army of 10,500 men and fresh Swiss troops to Nancy against Charles. In January 1477, during the battle of Nancy, Charles' army, weakened and reduced in size, were routed by the Swiss and German army. As he was retreating with some 300 men, Charles was killed defending a bridge across the river Moselle (Fig. 1.5).



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Fig. 1.5 The body of Charles the Bold discovered after the battle of Nancy, by Charles Houry (1862)

As was usual in those days, fallen enemies were stripped of arms and uniforms soon after the battle. A witness stated that he could indicate the place where Charles was killed, and his naked and frozen body was discovered in a pool of water. His face was unrecognisable as his skull was cleaved

in two from above his heart to his teeth from a slash by a halberd; the body had also been pierced by Swiss pikes. He was identified by his Italian page, Baptiste, who had been with him during the battle, by his long and ingrown nails, scars from previous battles, but mainly by some missing upper front teeth, which he had lost following a previous fall from his horse.

Charles' body was initially embalmed and buried in the ducal church in Nancy by René II, the Duke of Lorraine. Many attempts were made to bring his body to Bruges, but all in vain. Finally, an exhumation took place in 1550, but the skeleton in the coffin was in such a bad condition that the remains could not be identified as those of Charles the Bold. The presumed remains of Charles were transferred to Luxemburg and in 1553 were buried next to his daughter, Mary of Burgundy. Anthropological examination in 1979 positively identified the remains of Mary in the lead coffin, but failed to identify the body in the mausoleum in Bruges as that of Charles the Bold (Fig. 1.6).



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Fig. 1.6 Tomb of Mary of Burgundy and Charles the Bold in the Church of Our Lady in Bruges

1.2.3 Paul Revere

Paul Revere was not only a dentist, a silversmith, and an engraver, but also a colonial military officer from Boston. He had helped organise an intelligence network and alarm system to observe the movements of the British military during the American Revolution.

Revere's friend and compatriot Joseph Warren, in civilian life a distinguished surgeon and colonist leader in Boston, became a general in 1775 but was killed almost immediately, in the Battle of Bunker Hill. Because soldiers killed in battle were often buried in mass graves, Warren's grave was left unmarked. Months later, after the British troops had left Boston, friends of Warren's decided to try to locate his grave, to give him a proper burial. After being buried for nine months, his face was unrecognisable but Paul Revere, who was his dentist, was able to identify his body by a small denture carved in ivory and fixed with silver thread, replacing one of his upper teeth. Revere recognised the wire he had used for the denture. Moreover, in his casebook of February 22nd 1773, Revere had mentioned that Warren had visited the surgery to have a premolar removed. From an old picture taken in the 1860's, when Warren's body was removed to another tomb, it seems that the only premolar missing is the first premolar in the left upper jaw.

1.2.4 768 years

William Rufus, son of William the Conqueror, succeeded his father to the British throne in the year 1089, as William II. He died in a hunting accident in the New Forest in August 1100, and was buried in Winchester Cathedral.

In 1868, his tomb was opened, to verify that it still contained the remains of the king. It was reported that the tomb contained the 'skeleton of a man, almost in his entirety, though much broken'. Attempts to measure the long bones were made, but failed as the bones disintegrated. What surprised the examiners was that the teeth were

found in a condition 'as if the king had been buried yesterday', instead of almost eight centuries ago.

This was a reminder that teeth are amongst the hardest and most robust tissues of the body, often making the mouth the last place to find evidence, in the identification of unknown remains.

1.2.5 Murder at Harvard: The Parkman-Webster case

(1849)

The Parkman-Webster murder case concerned the disappearance in November 1849 of the Boston businessman, Dr George Parkman, the discovery of a partially dismembered and burnt body, and subsequently the trial and conviction of Prof. John W. Webster for murder. It was the first time that dental evidence and bone fragments were accepted and used as forensic evidence in court.

George Parkman was a prominent citizen of Boston, who had trained as a medical doctor in the UK, but moved back to Boston and was known more as a dealer in real estate and a money lender. For over 40 years Parkman had known Webster as a colleague at the Massachusetts Medical College, where Webster was professor of chemistry. Moreover, Webster was in heavy financial debt to Parkman.

On Friday November 23rd 1849, Parkman seems to have visited Webster in his chemistry laboratory, in the basement of the college building, to collect part payment of his loan. He was not seen alive again.

The police started an investigation and were informed that parts of a dismembered body had been found in a vault underneath the college building. The remains belonged to a man of Parkman's build. In a subsequent police search of Webster's laboratory on November 30th, the remains of a denture, some melted gold and small calcined fragments of human bone were found in an assay furnace. Webster was immediately arrested and charged with the murder of Mr Parkman.

The trial began in March 1850 and lasted two days. Webster pleaded not guilty, but the jury found him guilty, by a unanimous verdict. The court sentenced Webster to death.

The dental evidence in this case proved the identity of the unknown victim. Dr Nathan Keep and his assistant, Dr Lester Noble, demonstrated in court that the recovered parts a block of mineral teeth and a pattern plate were the remains of a partial denture made by Dr Keep for Parkman in October 1846. They perfectly fitted a plaster model of Parkman's mandible which Dr Keep had kept in his surgery. This is considered a classic case, because for the first time in the legal history of the United States, dental evidence and scientific testimony were accepted in a murder trial.

Debate continued for years about a number of aspects of the case. A century after the trial, one author observed that "the Parkman murder case" stands as a classic example of how a jury can reach a sound verdict despite an unfair trial, but another stated that a number of elements in favour of Dr Webster had not been taken into consideration by the jury.

1.2.6 Bite mark cases: Mrs Crémieux, and "The amber imprint"

An elderly lady, Mrs Crémieux, was found dead by strangulation, in her apartment just outside Paris. The police investigation revealed that around the time of the murder, a young man had presented himself at a local pharmacy asking for a wound in his hand to be dressed. This fact was known to Prof. Brouardel, a renowned forensic expert. He was aware that sometimes during strangulation, victims manage to bite their attacker. The professor ordered a post-mortem of the victim and noticed the irregular and defective condition of the old lady's teeth. He had impressions taken and plaster models made, which he kept as three-dimensional evidence, in case a suspect should be arrested. About a week later, a young Frenchman

was arrested in Mons, Southern Belgium. On one of his hands, marks could be seen which could well have been bite marks. He was sent to Paris where it was proved that the teeth on the victim's plaster model, perfectly matched the marks on his hand.

A banker had been murdered in his apartment in St. Petersburg. No evidence could be found to assist in identifying the culprit. However, next to the body lay an expensive cigar holder, made of Meerschaum and with an amber mouthpiece. The tip of this mouthpiece clearly showed two unequal impressions, one deeper than the other and obviously caused by habitual wear from irregular front teeth. As the impressions on the mouthpiece did not match the victim's teeth, the cigar holder might have belonged to the murderer. During the inquiry, the victim's cousin was interviewed as he was known to have visited the deceased about half an hour before his death. The judge noticed that one of his lower incisors was clearly shorter than the others, and asked him to try the mouthpiece. It took a matter of seconds to prove that his lower front teeth exactly fitted the impressions on the mouthpiece.

These two cases show that when enough attention is paid to tooth-related details, bite mark evidence can be found and the biter identified.

1.2.7 Bazar de la Charité (Paris, 4th of May 1897)

Although some cases of major disasters mention forensic odontology as the prime identification method, The fire at the Bazar de la Charité in Paris, on May 4 1897, may be considered the beginning of the use of forensic odontology in mass-disaster victim identification. The Bazar de la Charité was an annual event, lasting a week and organised by the Roman Catholic Church, the nobility and the leading families of France. It was, therefore, a major social event. On the second day of the event, there was an incident that set the building on fire. More than a thousand people were present at the time, and unfortunately 117 died in the inferno.