The Sankalpa: International Journal of Management Decisions
ISSN: 2454-7425
Volume 12, Issue 2 (July - December 2026)

Identifying Victims of Mass Natural Disasters Using DNA Profiling: How Effective Is It?

[1]Dr. Kacimi Hamid
University of Continuing Education – Djelfa Center, Algeria
hamid_kacimi@hotmail.com
[2]Dr. Karima Abbasi
Mohamed Lamine Debaghin University, Setif 2, Algeria
siham.annassi@cu-barika.dz

Revised: 12.01.2026 Accepted: 11.03.2026 Published: 22.07.2026

Abstract
This study examines the effectiveness of DNA profiling in identifying victims of mass natural disasters, where conventional identification methods often prove inadequate. Using a descriptive and analytical approach, it explores the scientific basis of DNA profiling, the procedures followed in disaster victim identification, and the legal considerations governing its use. The study also highlights selected practical experiences, including the Algerian response to the 2003 Boumerdès earthquake and the Bab El Oued floods. It concludes that DNA profiling is a highly accurate and reliable identification tool when supported by standardized forensic procedures, qualified laboratories, and an appropriate legal framework.
Keywords: DNA profiling; Disaster victim identification; Mass natural disasters; Missing persons; Forensic science.

Introduction:

Whereas the identification of individuals used to be limited to fingerprints, scientific advances have meant that identification is now based on scientific methods that go beyond fingerprints. Consequently, DNA profiling has become one of the most important tools used in the field of forensic science. However, this is not the only area where DNA profiling is used for identification; there are other fields, notably the establishment of parentage and the identification of missing persons.

Thus, whilst it used to be extremely difficult to identify missing persons during large-scale natural disasters – particularly given the high number of missing victims – it has now become possible to identify them through their DNA, following scientific methods and a series of procedures, whilst adhering to a set of conditions that ensure the accuracy of DNA test results.

Numerous studies have demonstrated that DNA profiling has played a significant role in identifying missing persons during natural disasters (earthquakes, floods, etc.) and mass disasters (fires, plane crashes, etc.etc.), even long after they went missing. Algeria, like other countries, has recently implemented procedures for identifying missing persons using DNA profiling; the most notable examples of this are the identification of those missing following the Boumerdès earthquake and the Bab El Oued floods.

Accordingly, the issue at hand in this field can be formulated as follows: **to what extent can DNA profiling be relied upon to establish the identity of missing persons during mass natural disasters?**

This issue can be addressed through the following sections:

First area: The conceptual framework of the study.

Second axis: The theoretical framework for the role of DNA profiling in identifying missing persons following mass natural disasters.

Third area: The practical framework for the role of DNA profiling in identifying missing persons following mass natural disasters.

First area: The conceptual framework of the study:

DNA profiling is one of the most significant achievements of scientific research and one of the most important modern methods for identifying missing persons in general, including those missing in large numbers due to exceptional circumstances, particularly mass natural disasters.

On this basis, within this section we shall address the definition of the concept of a DNA profile, as well as the concept of persons missing as a result of mass natural disasters, through the following two points:

01 – The concept of a genetic fingerprint:

In this section, we shall address the definition of a genetic fingerprint, distinguish it from similar concepts, and identify its characteristics, as follows:

A – Definition of a genetic fingerprint:

In language, the term 'fingerprint' means a mark or stamp (1), and in technical terminology, a genetic fingerprint has been defined by a number of definitions, the most important of which are set out below:

- A genetic fingerprint is the genetic structure, in relation to the specific inherited genes that indicate the identity of each individual (indicating the identity of each specific person), and as such is a highly accurate method.

- It is a method that is virtually infallible in verifying biological parentage and confirming identity.

- It is the mark or trace passed down from parents to children or from ancestors to descendants(2) .

- It is a non-living substance found within cells, namely deoxyribonucleic acid (DNA) (3) .

- It is a biological structure that takes the form of a biological ladder (helix) coiled and twisted around itself, much like a lock of hair is tightly and precisely twisted in a continuous manner(4) .

- It is the genetic profile resulting from DNA analysis of one or more genetic marker systems (5) , which contains information unique to an individual that distinguishes them from others and enables them to pass on these characteristics to their offspring (6) ; this is the definition we prefer for a genetic fingerprint.

DNA constitutes the fundamental material of which chromosomes are composed; there are 23 pairs of these in every cell. Each cell contains 04 biological chemical groups that play a specific role in the life of the cell; they are biologically interconnected, much like the different words that make up a language[(7)] .

DNA is a chemical compound with a high molecular weight that is essential to living organisms; it is known as DNA, which is an abbreviation for **deoxyribonucleic acid**.

DNA is what carries genetic information; it consists of two circular strands of nucleotides arranged in a helical structure. This acid is found in the nuclei of living organisms' cells, which is why it is called 'nucleic' [(8)] .

B – Distinguishing the genetic fingerprint from similar concepts:

A genetic fingerprint bears similarities to certain related concepts, the most important of which are:

- Physiognomy: which refers to determining lineage through observation and examination of a newborn's physical features.

- **Physical characteristics:** the most important of which are:

• **Fingerprints:** which refer to the impressions left by the fingers when they come into contact with a smooth surface; these are exact replicas of the patterns of papillary lines covering the skin of the fingers, and are never identical between two people; indeed, they do not even match on the fingers of a single person.

• **Footprints:** These are the marks left by a person's feet and are usually used as a means of identifying certain medical conditions, such as congenital deformities of the human body, lameness, etc.

• **Earprints:** These refer to the visible markings and distinctive features on the earlobe, which are unique to each individual; they are never identical between two people.

• **Eye prints:** These are more accurate than fingerprints, as each eye has characteristics that are unique to it. They are usually used for security purposes, such as securing bank vaults [(9)].

We can therefore observe a difference between genetic fingerprints and other types of fingerprints, as the lifespan of the latter usually depends on their location and how they are preserved, They are also susceptible to damage due to contact with dirt or the passage of time; consequently, unless they are stored in a sealed, dust-free container and remain untouched, they will not last long. Even if stored in such conditions, they will remain viable for approximately two to three months[(10)] .

Whereas a genetic fingerprint extracted from DNA—given that DNA is always present and concentrated in the cell nuclei of all living organisms, ranging from bacteria, fungi, plants and animals, right up to humans (with the exception of human red blood cells, as these do not have a nucleus) [(11)], it does not degrade rapidly and has a long shelf life.

C – Characteristics of the genetic fingerprint:

The genetic fingerprint, as defined above, is characterised by a number of features, the most important of which are that:

- It varies from person to person; no two people on Earth have identical genetic fingerprints, with the exception of identical (true) twins.

- Its sources are numerous and varied, making it possible to obtain it from any human remains, whether liquid (blood, saliva, etc.) or tissue (flesh, bone, skin, hair, etc.).
- They are present in every cell of the body except red blood cells.
- They are identical in all of a person's cells.
- They are resistant to decomposition, decay and other environmental factors.
- They appear in the form of broad lines that are easy to read, recognise, save and store on a computer until they are needed [(12)] .

02 – The concept of a person missing as a result of mass natural disasters:

Linguistically, **a** '**missing person**' is someone who has gone astray; technically, it refers to an absent person of whom all news has ceased and whose whereabouts and trace have vanished, such that it is no longer possible to distinguish between life and death. A person is only considered missing by virtue of a ruling[(13)] .

This refers to a person who has been absent from their homeland or place of residence for such a prolonged period that all contact with them has been severed, to the extent that it is no longer possible to determine whether they are alive or dead. In such cases, the law permits them to be presumed dead provided certain conditions are met, and their legal personality ceases from that point onwards [(14)] .

A **natural disaster**, on the other hand, can be defined as an incident caused by natural factors, whether climatic or non-climatic, such as floods, earthquakes, cyclones and the like, which usually result in human or material losses, regardless of the extent of such losses.

Mass disasters are incidents in which the victims are groups or large numbers of people, whether caused by natural factors (mass natural disasters) or human factors (aircraft crashes, train derailments, bomb explosions, etc.).

Mass natural disasters, on the other hand, are incidents caused by natural factors, the victims of which are a group of people.

On this basis, we can say that **a person missing as a result of a mass natural disaster** is an absent individual whose status—whether alive or dead—has remained unknown since the date of the natural disaster or as a result of it.

Section Two: The theoretical framework for the role of DNA profiling in identifying persons missing as a result of mass natural disasters:

Genetic profiling is of great importance at present, and this importance lies in the fields in which it is used or relied upon, the most significant of which include its contribution to: resolving cases of theft, rape and murder …etc., establishing family relationships, paternity and inheritance; diagnosing genetic diseases affecting foetuses; and ensuring compatibility between a transplanted organ and the recipient's body [(15)] .

The importance of DNA profiling also lies in its status as conclusive evidence for identifying missing persons, particularly in the wake of mass natural disasters where it may be impossible to identify some bodies due to the damage they have sustained (disfigurement, charring, decomposition, putrefaction, etc.).

On this basis, within this section we shall address the regulations governing DNA profiling and the conditions for its use, as well as the sources and methods for its extraction, as set out in the following points:

01 – Regulations and conditions for the use of DNA profiling:

The extraction of DNA is carried out only in accordance with specific regulations and conditions, which we address below:

a – Regulations governing the admissibility of DNA evidence:

For DNA profiling to be accepted as evidence in all areas where it may be used for evidential purposes – including the identification of persons missing as a result of mass natural disasters – certain regulations or restrictions must be in place and adhered to. The most important of these are:

- **Procedural controls:** These involve: the collection and documentation of samples; the application of appropriate standards in their analysis; the monitoring of DNA; and the protection of the information or data obtained.

- **Substantive controls:** These involve analysing the methods (approaches and techniques) of analysis, followed by the identification of genetic loci **(16)**.

B – Conditions for genetic fingerprinting:

The analysis leading to the determination of a person's genetic fingerprint – including analyses aimed at identifying those missing as a result of mass natural disasters – must be carried out in accordance with specific conditions, the most important of which are as follows:

- The genetic profile must be accepted by specialists in the field.

- The services of as many experts as possible in the fields of genetics and biology (technical experts) must be utilised.

- No DNA analysis may be carried out without the authorisation of the competent authority.

- DNA testing must be carried out in state-run laboratories, with the option of using private laboratories subject to state supervision.

- The laboratories in which DNA testing is carried out must be equipped with the best high-tech equipment and technical specifications that are suitable for the country's specific conditions and capable of handling the samples and their surrounding environment.

- Staff working in the laboratories where DNA testing is carried out must be of proven integrity (both in terms of knowledge and character); they must not be related to, hostile towards, or have any financial interest in the individuals being tested; nor must they have previously been convicted of crimes involving a breach of honour.

- It is preferable for genetic testing to be carried out using as many methods as possible to ensure the accuracy of the test results to the greatest extent possible.

- Others prefer that the tests be carried out in at least two recognised laboratories **(17)**

02 – Sources and methods of DNA extraction:

The process of determining a genetic fingerprint involves taking a pinhead-sized sample from a person (from blood, hair, bone, saliva, … and other samples) to be analysed and examined for the chromosomes (chromosomal segments) that carry genetic traits, namely genes. Thereafter, a kinship link between the person being tested (the missing person) and their relatives can be confirmed or ruled out **(18)** .

Accordingly, in the following two points we shall discuss the sources from which DNA profiles are extracted and the methods used to analyse them.

A – Sources for extracting DNA:

There are numerous sources of DNA in the human body; it can be obtained from parts containing human cells in which DNA is present.

However, scientists have identified specific sites in the human body from which DNA can be obtained, namely: blood, skin tissue, bone tissue, fingernails, hair, saliva, mucus, semen, teeth, urine, amniotic fluid, fertilised oocytes or kidney cells, …etc. [(019)] .

B – Methods of DNA analysis: (Scientific methods for obtaining a DNA profile)

Jeffreys was the first to develop a new technique for obtaining a DNA profile, which can be summarised as follows:

- Extracting a DNA sample from the body or its fluids.

- Cutting the sample using a specific enzyme capable of cleaving the DNA strands, thereby separating the bases adenine (A), guanine (G), thymine (T) and cytosine (C).

- Arranging these fragments using a method called electrophoresis, which produces long bands of the separated DNA fragments, the length of which depends on the number of repeats.

- The fragments are exposed to X-ray film and printed onto it, appearing as dark, parallel lines [(20)] .

In fact, there are several methods for analysing DNA and obtaining the genetic fingerprint of the individuals being tested; we will focus on those methods that can be used to identify missing persons. Among the most important of these methods are the following:

• The method of studying and analysing the different alleles of specific regions:

This method is the primary one in the field of genetic fingerprinting for determining individual characteristics through differences in the phases or distribution of the basic nucleotides of DNA, relying on enzymes extracted from certain types of bacteria that cleave the DNA according to the presence of specific sequences of nucleotides on it, resulting in the production of small fragments of DNA. As the location of these sequences along the DNA strands varies from one person to another, the use of these enzymes leads to the fragmentation of DNA into fragments of varying lengths; by analysing these, it is possible to distinguish between individuals and determine their identities.

This method involves the following steps:

- Extracting DNA from various biological sources.

- Sampling a portion of the solution containing the extracted DNA to determine whether the amount of DNA extracted is sufficient and suitable for analysis.

- Fragmenting a portion of the DNA using specific enzymes into several million fragments.

- Transferring the solution containing the DNA fragments into wells made in a gel through which an electric current is passed.

- Separating the fragments according to their lengths from the two ends of the gel medium using an electric potential.

- A thin nylon membrane is placed over the gel and pressure is applied so that the separated fragments are transferred onto the surface of this membrane from the less stable gelatinous medium to a more stable medium.

- Separating the double-stranded DNA into single strands by altering its thermal properties, then fixing these molecules to the strands using probes or reagents.

- Transferring invisible DNA fragments onto film plates for reading by a computer programmed for this purpose, after they have been exposed to certain reagents or radiation such as X-rays and others.

Experiments have demonstrated the accuracy of this method for genetic fingerprinting in distinguishing between individuals, as it can be used to confirm that a sample belongs to a specific person; it is also an effective tool in cases of paternity testing and criminal investigations.

Practical applications have also confirmed that this method can identify mixed biological samples and trace each sample back to its original source.

The results of this method are very clear, as they can be read with the naked eye; furthermore, each genetic segment can be identified, compared and stored using a computer dedicated to this purpose.

However, a drawback of this method is that it is time-consuming, potentially taking up to a month; it also requires sufficient quantities of biological samples to carry out the analyses. Furthermore, this method involves exposing the samples to certain radioactive substances, which is a burdensome process, and it also results in considerable difficulty in compiling the necessary statistics **(21)**.

This method can be considered useful for identifying people missing as a result of large-scale natural disasters, given that samples are not usually scarce in such incidents, particularly as it is an accurate method.

• Polymerase chain reaction (PCR) method:

When the available DNA samples are small – that is, in cases where it is not possible to obtain sufficient quantities of biological samples suitable for testing – this method is used, as it requires only a small fragment of DNA, which can then be amplified and replicated into new copies.

Although this method has significant advantages in distinguishing between individuals, it is criticised for being prone to contamination by foreign DNA, particularly when strict precautions are not taken during sample collection, and especially when laboratories are not highly specialised in this field **(22)**.

Therefore, this method is only useful for identifying missing persons following mass natural disasters, when very few samples from the missing are available. An example of this is in cases of explosions where bodies are reduced to small fragments; in such cases, this method is the best for examining the samples and establishing the identities of the missing.

• The analysis of short repetitive sequences:

Similar to the previous method, this technique enables analysis to be carried out on very small quantities of DNA, even if it is fragmented or mixed with another person's sample.

This method is among the most advanced in the field of DNA testing and genetic profiling; it is characterised by extreme accuracy and clear results, and it enables the analysis of extremely small fragments.

However, its drawbacks include the difficulty in operating the testing equipment and its high cost [(23)] .

Consequently, this method is very useful for identifying missing persons following mass natural disasters, particularly in cases of explosions where bodies and samples may become mixed up, but this method may be difficult to implement in developing countries, particularly as experts in these countries lack the technical skills required to operate the sample analysis equipment.

The third section: The practical framework for the role of DNA profiling in identifying missing persons following mass natural disasters:

Although only a short time has passed since the discovery of DNA profiling, it has led to a rapid transition from academic research to applied science across the globe, particularly in cases where forensic science is unable to find solutions for establishing identities [(24)], especially the identities of those missing as a result of mass natural disasters.

On this basis, in this section we shall address the most important practical applications for identifying those missing as a result of mass natural disasters (global and Algerian experiences), and then assess the role of DNA profiling in identifying those missing as a result of such disasters, through the following two points:

01 – A review of some experiences in identifying missing persons following mass natural disasters using DNA profiling:

There are several practical examples from across the globe in which DNA analysis has been used to identify those missing as a result of mass natural disasters. Algeria, like other countries around the world, has also adopted this method; we shall therefore attempt to outline the most significant of these examples below:

A – An overview of some initiatives to identify missing persons following mass natural disasters in Western countries:

Western countries have witnessed numerous cases in which the identities of people missing as a result of mass natural disasters were established through the use of DNA analysis. Among these examples, to name but a few, we highlight the following:

- In **the United States of America**, DNA testing was used to identify many of those missing following the 11 September 2001 attacks (mass disasters), where American forensic experts used DNA profiling to identify the remains of charred bodies and crushed bones, as the explosion of the aircraft, which were carrying huge quantities of fuel, resulted in the complete incineration of the victims' bodies, and the bones of victims who were on the lower floors when the building collapsed were completely crushed[(25)] ; had this technology not been available, the victims of those attacks would not have been identified.

Had this technology not been available and had it not been utilised, the victims would not have been identified, as more than 12,000 DNA samples were taken for analysis in attempts to identify the victims[(26)]. Those in charge of the operation estimated that forensic experts were able to identify around 700 bodies per day[(27)] .

- In **Canada** in 2001, the remains of three victims of the famous Titanic shipwreck, buried at Halinax in Nova Scotia, were identified using DNA analysis; the remains were those of a child, a young man and a woman in her thirties [(28)] .

- In **France,** DNA analysis was used extensively to identify the victims of the **Airbus** 320 that crashed into Mount Sainte-Odile near the city of Strasbourg in the east of the country in 1992[(29)] .

- In **Argentina**, DNA testing was used to help reunite children with their parents after they had been abducted and murdered by the fascist military regime[(30)] .

B – Overview of the use of DNA testing to identify missing persons following mass natural disasters in Arab countries:

Some Arab countries have also relied on DNA testing to establish identity, including that of people missing as a result of mass natural disasters. Examples of this include:

- In **Egypt**, following the crash of the Egyptian Boeing 747, news agencies reported the return of the remains of 25 Egyptian victims recovered from the ocean floor; their identities were confirmed through DNA testing[(31)] .

- In **the Kingdom of Saudi Arabia**, DNA testing was used to identify a person whom a woman claimed was her brother, who had been missing for 30 years. Samples were taken from the man, the woman and her siblings, and it was concluded that the man in question was not the woman's brother[(32)] .

C – Overview of efforts to identify missing persons following mass natural disasters in Algeria:

DNA profiling was used in Algeria to identify some of those missing following the Boumerdès earthquake and the Bab El Oued floods. This can be illustrated by the following points:

- Some bodies were found by members of the public and security personnel in valleys and on rooftops; some were washed ashore by the sea; and others were found in trees, etc. Many of these bodies were so badly disfigured that it was impossible to identify them.

- The bodies found were transferred by the civil protection services to the mortuary services; the number was so high that it reached into the thousands. As the mortuary services in Bab El Oued were unable to accommodate all the bodies found following the floods, they were transferred to civil protection barracks.

- After the bodies had been transferred, they were photographed and a form was completed for each one, containing the identifying details of the body.

- As for the bodies whose identities could not be established and which were severely disfigured, the forensic pathologist extracted DNA from the spinal cord of the bodies, specifically the spinal cord attached to the right femur, even if it was desiccated, which was then matched against relatives of the missing persons. In the case of the Bab al-Wad earthquake, 30 Spanish experts were called upon [(33)] .

A notable example where DNA profiling was used is as follows: a family from Algiers managed to recover the body of their young child, who had been swept away by floodwaters and buried after another family claimed the child was theirs. Months later, the child's real family took action to lodge a complaint with the public prosecutor to recover the body,

Consequently, and thanks to the efforts made in this complex case, the decomposed body was recovered and samples were taken from it, as well as from the child's biological parents. These were sent to Spain for analysis using a DNA testing system, and the results revealed that the body did indeed belong to the parents who had filed the claim[34] .

02 – Assessing the role of DNA profiling in identifying missing persons following mass natural disasters:

The role of DNA profiling in identifying missing persons serves as conclusive evidence of identity, particularly in the case of mass natural disasters where it is impossible to identify some bodies due to the disfigurement and charring they have sustained[35] .

Although there are no genuine criticisms that cast doubt on the scientific value of DNA testing results, observations continue to focus on technical errors that may occur [36] , particularly given the pressure of a mass natural disaster and the high number of bodies.

On this basis, opinions have varied, particularly regarding the results of genetic fingerprinting and their reliability; some have argued that it is merely a method like any other biological method and therefore its results cannot be considered 100% accurate.

Genetic profiling is therefore not without its flaws, as stated by experts in the field, many of whom have said that its results do not reach 100 per cent accuracy, even if they come very close to it. However, this scepticism has diminished the value of genetic profiling results in the eyes of some people, particularly when it comes to identifying missing persons during natural disasters.

Some scholars have stated that DNA profiling remains susceptible to misleading results if not used with precision, due to shortcomings in the evidence which can sometimes render the entire evidence invalid; these shortcomings may be attributable to: deficiencies in technical and scientific aspects, and deficiencies in procedural and legal aspects.

On this basis, it can be concluded that errors in DNA analysis and genetic profiling remain a possibility [37] .

Conclusion:

In conclusion to this research, we can record a number of findings, the most important of which are set out in the following points:

- Genetic profiling is an important modern method of evidence and a key means of verifying identity; it differs from and is distinguished by other methods and forms of evidence, both in terms of the methods and approaches used to rely on it and the accuracy of its results.

- DNA profiling is characterised by the need to adhere to precise conditions, controls and methodologies that guarantee the validity and accuracy of its results in establishing individuals' identities, compared with many other forms of evidence, including various types of physical fingerprints.

- Experiences in various Western and Arab countries, including Algeria, have demonstrated that reliance on the results of DNA testing to establish the identity of persons missing as a result of mass natural disasters is of the utmost importance, as the identities of many people missing due to such disasters have been confirmed through the comparison of their DNA with that of their relatives.

- Despite the accuracy of DNA profiling results in establishing identity in general—including that of missing persons—this method has not been immune to criticism, on the basis of which DNA profiling has been regarded as merely another biological method, susceptible to potential errors in its results.

- Errors in DNA test results and the subsequent identification of missing persons, whilst significant, are extremely serious if not verified and if an error in the DNA analysis is confirmed.

- Developing countries, including Algeria, still lack the necessary scientific, technical and professional expertise to carry out DNA testing and identify missing persons during natural disasters; consequently, they usually turn to Western countries, which possess advanced technologies and qualified experts, for assistance in this area.

On this basis, we may conclude this study by stating that the role of DNA profiling in identifying those missing as a result of mass natural disasters is of paramount importance and beyond dispute, as demonstrated by scientific experiments—despite some criticism—in Western countries possessing advanced technology and scientific expertise. However, the adoption of this technology in developing countries, including Algeria, will still take many years, given that the latter lacks the expertise and the technical, instrumental and human resources required to utilise this technology for identification purposes, including the identification of missing persons, except by resorting to Western laboratories. Therefore, if we are to rely effectively on DNA testing results to identify missing persons, we must lay the necessary groundwork by seriously commencing the recruitment and training of technical experts in the use of modern equipment for DNA analysis.

List of references:

(1) - Ilham Salih bin Khalifa, The Role of Fingerprints and Other Physical Evidence in Criminal Evidence: 'An In-Depth Study of All Types of Crime Scene Evidence and Their Degree of Conclusiveness in Criminal Evidence', Dar al-Thaqafa, Amman, Jordan, 1st ed., 2014, p. 106.

(2) - Khalifa Ali Al-Ka'ibi, 'DNA Profiling and its Impact on Jurisprudential Rulings: A Comparative Jurisprudential Study', Dar Al-Nafais, Amman, Jordan, 1st ed., 2006, pp. 43–44.

(3) - Bilal Shalgoum and Abdelwahab Boukish, 'DNA Profiling', Graduation Thesis for Police Inspectors, Police Academy, Taybi al-Arabi, Sidi Bel Abbès, Algeria, 2nd Cohort, 2009–2010, p. 6.

(4) - Kazim al-Mashhadani, Forensic Medicine and Criminal Investigation, The Arab Academy in Denmark, Denmark, 2008, p. 56.

(5) - Khalifa Ali al-Ka'ibi, op. cit., pp. 43–45.

(6) - Shalgoum Bilal – Boukish Abdel Wahab, op. cit., p. 7.

(7) - Bilal Shalgoum – Abdul Wahab Bouqish, op. cit., p. 6.

(8) - Khalifa Ali al-Ka'ibi, op. cit., pp. 21–22.

(9) - Hassan Mahmoud Abd al-Dayim Abd al-Samad, 'Genetic Fingerprinting and Its Evidential Value: A Comparative Study of Islamic Jurisprudence and Positive Law', Dar al-Fikr al-Jami'i, Alexandria, Egypt, 2nd ed., 2011, p. 113 ff., adapted.

(10) - Kazim al-Mashhadani, op. cit., pp. 53 ff.

(11) - Ibid., p. 53 ff.

(12) - Hassan Mahmoud Abdel-Dayem Abdel-Samad, op. cit., pp. 95–106, adapted.

(13) - Mas'ud al-Hilali, Provisions on Inheritance and Bequests in Algerian Family Law, Jisur, Constantine, Algeria, 1st ed., 2008, p. 215.

Mansour Kafi, Inheritance in Sharia and Law, Dar al-'Ulum, Annaba, Algeria, 2008, p. 115.

Article 109 of the Algerian Family Code No. 84/11 dated 9 June 1984, as amended and supplemented.

(14) - Hassan Mahmoud Abdel-Dayem Abdel-Samad, op. cit., pp. 844–845.

(15) - Hassan Mahmoud Abdel-Dayem Abdel-Samad, op. cit., pp. 113–114.

(16) - Ibid., pp. 477 ff.

(17) - Khalifa Ali al-Ka'ibi, op. cit., p. 50, adapted.

Hassan Mahmoud Abdel-Dayem Abdel-Samad, op. cit., pp. 477 ff.

(18) - Ben Saghir Mourad, 'The Evidential Value of DNA Profiles and Their Role in Establishing Paternity: A Comparative Analytical Study of the Extent to Which Recent Amendments to the Algerian Personal Status Law Are Consistent with Islamic Jurisprudence', Journal of Politics and Law, Faculty of Law and Political Science, University of Ouargla, Algeria, Issue 09, 2013, p. 253.

(19) - Hassan Mahmoud Abdel-Dayem Ad-Samad, op. cit., p. 375.

(20) - Chalgoum Bilal – Boukish Abdelwahab, op. cit., p. 08.

(21) - Hassan Mahmoud Abdel-Dayem Abdel-Samad, op. cit., pp. 408–411.

(22) - Ibid., pp. 411–414.

(23) - Ibid., pp. 414–415.

(24) - Ibid., p. 408.

(25) - Ibid., p. 855.

(26) - Zouami Fathi, 'Genetic Fingerprinting and Its Evidential Value', Master's thesis in Law, specialising in Business Administration, Faculty of Law and Political Science, University of Khemis Miliana, Algeria, 2012–2014, p. 41.

(27) - Hassan Mohamed Abdel-Dayem Abdel-Samad, op. cit., p. 588.

(28) - Ibid., p. 855.

(29) - Chalgoum Bilal and Boukish Abdelwahab, op. cit., p. 14.

Zouami Fathi, op. cit., p. 91.

(30) - Bilal Shalgoum and Abdelwahab Boukish, op. cit., p. 14.

(31) - Fathi Zouami, op. cit., p. 90.

(32) - Hassan Mahmoud Abdel-Dayem, op. cit., p. 855.

(33) - Lectures delivered to forensic police officers, Forensic and Technical Police Academy, National Institute of Criminal Police, Sahoula, Algiers, 2015–2016.

(34) - Bilal Chelghoum and Abdelwahab Boufich, op. cit., p. 20.

(35) - Zouami Fathi, op. cit., p. 90.
(36) - Bilal Chelghoum and Abdelwahab Boufich, op. cit., p. 20.
(37) - Khalifa Ali al-Ka'ibi, op. cit., p. 63.