

# Deciphering of Latent Handwritings in a Century-Old Document

## Bir Asırlık Belgede Yer Alan Silinmiş El Yazılarının Deşifre Edilmesi

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**ABSTRACT** This case report is presented to reveal the contribution of different disciplines to forensic sciences via a case that required the examination of a questioned historical document with the support of a native Romanian speaker and linguist who contributed to differentiating several specific letters and confirming the deciphered names of the locations to understand the full text of the latent handwritings on the document. In this case, Document Examination Laboratory was asked to decipher the latent handwritten words on a birth certificate belonging to the applicant's ancestor. As a result of the examination made under ultraviolet light using VSC8000, the latent parts were deciphered, and the words were confirmed with the support received. In this case, the fact that the laboratory had successfully deciphered the words in the document, led to the applicant's right to apply for Romanian citizenship through his grandfather.

**Keywords:** Handwriting; latent handwriting; faded inks; forensic document examination; questioned document examination

**ÖZET** Tarihi bir belgenin incelenmesini gerektiren bu olgu sunumu, farklı disiplinlerin adli bilimlere katkısını göstermek amacıyla yok olmuş el yazılarının deşifre etme, bazı spesifik harfleri ayırt etme ve coğrafi yer isimlerinin doğrulaması aşamasında çalışmaya katkıda bulunan, ana dili Romence olan bir dil bilimcinin desteğiyle gerçekleştirilmiştir. Olgu kapsamında, Belge İnceleme Laboratuvarı'ndan başvuran şahsın dedesine ait bir doğum belgesindeki silinmiş el yazılarının deşifre edilmesi istendi. VSC8000 kullanılarak ultraviyole ışık altında yapılan inceleme sonucunda silinmiş kısımlar deşifre edilmiş, alınan linguistik destekle ise bu kelimeler doğrulanmıştır. Bu olguda, laboratuvarın belgedeki kelimeleri başarılı bir şekilde deşifre etmiş olması, başvuranın dedesi aracılığıyla Romanya vatandaşlığına başvuru hakkını elde etmesini de beraberinde getirmiştir.

**Anahtar Kelimeler:** El yazısı; silinmiş el yazısı; solmuş mürekkep; adli belge inceleme; şüpheli belge inceleme

Determining the originality of the document and falsified or destructed documents are widely examined using light sources with different wavelengths and filters in Forensic Document Examination. Similarly, detecting volatile inks used to deceive individuals or institutions or rendering the texts on burned documents can be done with the same optical methods. Some of the examinations made using light sources in Forensic Document Examination are similarly used for the examination of works of art and important historical documents.<sup>1-3</sup>

The document that is the subject of this study is a birth certificate which is a very important document as a confirmation of citizenship such as an identity document, driver's license, or other official documents in many countries. In general, it is known that

birth certificates are the subject of many discussions and studies in terms of reliability. However, it is still valid today, as it is the first official document specific to the person.<sup>3,4</sup> As the object of discussions within the framework of the internal practices of the states, "birth certificates and other citizenship indicator documents" are also the object of international issues. As an indication of the right to have citizenship in another country, these documents can be submitted to the relevant authorities.<sup>5,6</sup>

The ultraviolet (UV) fluorescence can be used to decipher elements in documents for various reasons such as making faded thermal printed text visible or finding out forgeries on the check or money. This happens because the UV fluorescence characteristic of a background such as paper is drastically

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different from ink fluorescence in general. Another application of UV fluorescence consists of distinguishing between previously and newly repainted or retouched areas of a painting.<sup>7</sup>

## CASE REPORT

An application was made to our laboratory to make visible the lost handwritten texts on the printed document which is claimed to belong to 1923. The questioned document was a birth certificate and it had been reported that the document belonged to the applicant's grandfather. It was alleged that this document was drawn up during the Kingdom of Romania (1881-1947). The applicant's grandchildren stated that the ink was lost due to sweat and heat because his grandfather, the owner of the birth certificate, had kept it in the inside pocket of his jacket for years. The grandchildren aimed to prove that their grandfather was a citizen of Romania's predecessor, the Kingdom of Romania through this document.

After the examination, the owner of the document examined in the case report declared that he consented to the publication of this study and informed consent was obtained from the applicant.

Only the printed part of the text on the birth certificate could be read with the naked eye and under visible light. For this reason, the questioned document looks like an unfilled printed document as a first impression (Figure 1).

First of all, the document was examined with a magnifying glass and a stereomicroscope, but there was no result because the handwritten portion of the document was completely wiped off due to the storage conditions of the document.

Subsequently, the birth certificate was examined under oblique light to see the impressions, however, any groove of the handwriting strokes was not seen.

The document was examined under UV light using the VSC 8000 (Video Spectral Comparator, Foster & Freeman, United Kingdom) device, as the applicants had insisted that in previous years the document contained handwriting and that the writings

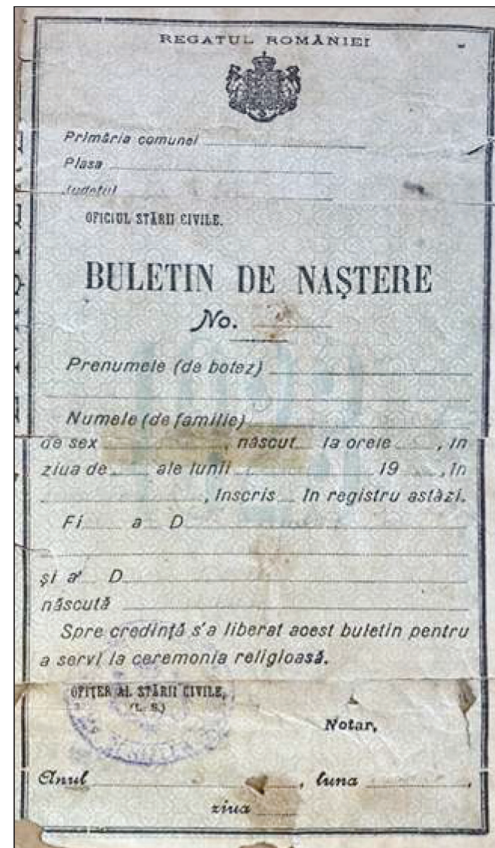


FIGURE 1: The image of the birth certificate under visible light.

would have been lost due to storage conditions. The document was analyzed across different spectral ranges from UV (a) Long wave 365 nm (nanometer) peak wavelength (b) Medium wave 312 nm peak wavelength and (c) Short wave 254 nm peak wavelength under the VSC 8000.

The optimized UV light was 254 nm to make visible faded ink of handwritten words (Figures 2, Figure 3, Figure 4). Since the size of the captured area by the camera objective is smaller than the document size, the examination was made on each captured part of the document separately.

The handwritten text is written in a cursive style, which makes it difficult to differentiate some letters (Figures 2, Figure 3, Figure 4). For example, the construction of the capital letters "T and D" in the 2<sup>nd</sup> figure and "I" in the 4<sup>th</sup> figure looked similar to the letters "F", "O" or "J" respectively.

Changes in writing style, variations in the Romanian language over 100 years, and changes in



FIGURE 2: Partial view of the document in 254 nm UV, 7.65 zoom ratio.  
UV: Ultraviolet.



FIGURE 3: Partial view of the document in 254 nm UV, 7.65 zoom ratio.  
UV: Ultraviolet.

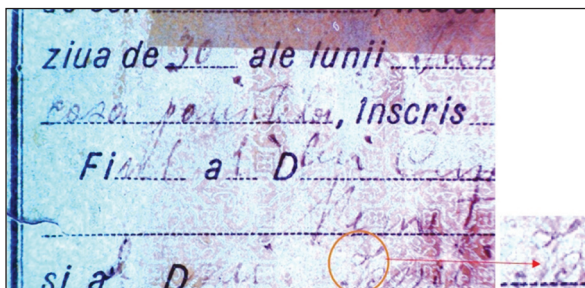


FIGURE 4: Partial view of the document in 254 nm UV, 7.65 zoom ratio.  
UV: Ultraviolet.

place names such as towns and neighborhoods at the time of birth necessitated the need to seek help from an expert who knows this language and the country. For this purpose, scientific support was received from a native Romanian speaker and an academic, who is a linguist and knows that geography well.

As a result; the information about the town where the certificate holder was born, the date of birth, the purpose of issuing the certificate, and the approbation date were deciphered. Among the elements in the content of the document submitted as a

birth certificate, only the “document number” information in the middle of the document could not be read due to excessive wear.

## DISCUSSION

When the birth certificate was examined under side lighting any pen impressions did not appear. The reason why any groove of the handwriting strokes was not seen may be related to the type of pen that was used to fill the document in that century because fountain pens or dip pens with ink pots were generally used 100 years ago.<sup>8</sup> Thus, the fine nip of the pen and the dispersion of the liquid ink on the paper do not leave a significant impression on the paper. In addition, the thickness of the paper, having stored the document as folded, the writing ground, and the writing instrument may have affected the existence of the groove of the writing.<sup>7</sup>

One of the limitations of the study is that the “document number” information in the middle of the document cannot be read due to the excessive wear of the document. Another limitation is that the capturing area size of the camera objective of the VSC 8000 does not provide the opportunity to examine the entire document at once. Our last limitation was that we struggled in establishing a logical connection between the articles made visible since the document was prepared in a different language. At this point, getting support from a Romanian linguist eliminated this limitation and enabled a multidisciplinary study.

This research this study differs from the studies in the literature and has made a substantial contribution to the literature as the examination subject is an official document that has no artistic value but has been the subject of issues related to citizenship.

The fact that the name of a geographical region (*Turtucaia*), which has a different name officially today (*Totrakan*), was read in this document without any prior knowledge or external influence. This word is provided to confirm that the document was issued many years ago.

At the end of the present case study, latent handwriting on a birth certificate was deciphered and reported to lay the results before the Romanian



governmental agencies. While the Romanian State provides the right of citizenship to individuals, it requires a birth certificate as stated in its official newspaper.<sup>9</sup>

The main conclusion that can be drawn from this work is that UV light is a fast, easy and non-destructive method that can be applied to decipher similar fading handwritings, and results can be obtained even on 100-year-old documents.

### Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

### Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

### Authorship Contributions

**Idea/Concept:** Faruk Aşıcıoğlu, Ayşegül Şen Yılmaz; **Design:** Ayşegül Şen Yılmaz, Özge Genç Sütü; **Control/Supervision:** Faruk Aşıcıoğlu; **Data Collection and/or Processing:** Özge Genç Sütü, Ayşe Şen Yılmaz; **Analysis and/or Interpretation:** Faruk Aşıcıoğlu, Ayşegül Şen Yılmaz, Özge Genç Sütü; **Literature Review:** Ayşegül Şen Yılmaz; **Writing the Article:** Özge Genç Sütü, Ayşe Şen Yılmaz; **Critical Review:** Faruk Aşıcıoğlu; **References and Findings:** Özge Genç Sütü, Ayşe Şen Yılmaz; **Materials:** Ayşegül Şen Yılmaz, Özge Genç Sütü.

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