

## Solving the Puzzle of Debora's Diary

### ABSTRACT

Twenty small, charred, and brittle fragments of a diary were donated to the United States Holocaust Memorial Museum (USHMM) collection in 2002 by the family of Lusia Hornstein. The twenty diary fragments were wrapped in a piece of a Polish newspaper and placed in an envelope, on which Lusia Hornstein wrote a notation outlining the diary's history. This notation contains the only available information about the diary's author.

The diary is written in black ink on both sides of a blue-lined, wove paper. The diary pages were so brittle and fragile that the originals could not be handled in order to be translated. Initially, the translator used good-quality photocopies that were made from slides; however the charred areas remained too dark to be legible. Different lighting arrangements during photography, coupled with manipulation of the images using the computer, allowed the contents of almost all of the fragments to be read. Electronic manipulation also led to the discovery that the fragments could be matched together, resulting in a more complete translation. This is a wonderful example of how easily available computer technology can be used to recover information from a document without endangering the artifact itself.

### INTRODUCTION

In 2002, twenty small, burned, and charred fragments of a diary (fig. 1) were donated to the collections of the United States Holocaust Memorial Museum (USHMM). Because the diary was in pieces and difficult to decipher, the curators did not know what information might be contained within its pages. The diary, written in Polish, was given to the museum by a Holocaust survivor named Lusia Hornstein.

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It was written by a friend of Lusia's and, for unknown reasons, Lusia kept the existence of this diary a secret for over fifty years. In August of 1998, while Lusia was ill and in the hospital, she told her family about the diary stating that she wanted it donated to the USHMM. It was donated after Luisa's death by her husband and children.

The only information received about the diary and its author was hand written by Lusia on the envelope in which the diary was donated. The brief notation tells us that the diary was written by Debora who was a friend of Luisa's. Using false identity papers, Debora lived in a house in Warsaw (outside the ghetto) where she kept the

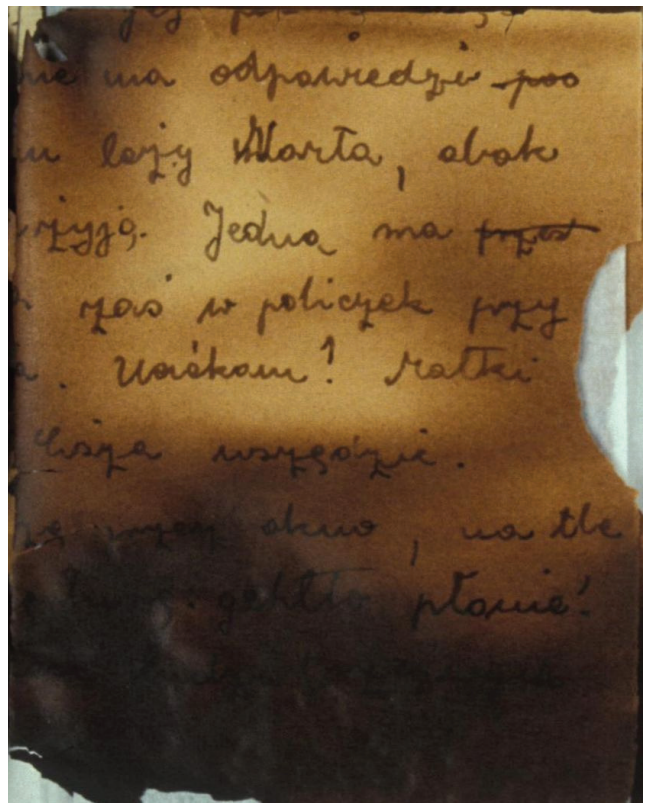


Fig. 1. Example of one diary fragment, normal light.

diary hidden. She was killed by a bomb during the Polish uprising of 1944. Several months after the Polish uprising and Debora's death, Lusia retrieved the diary from the burned-out remains of the house and wrapped it in a scrap of Polish newspaper dated Saturday, February 11, 1945.

#### Holocaust History

Only two dates appear in the diary; these dates are January 4 and January 5, 1943. It is not known where this diary was originally written; however, since the diary was recovered in Warsaw, a brief overview of events around the time the diary was written is outlined below (Harran et al. 2000).

In October 1940, a section of Warsaw was walled off, separating Jews from gentiles, and deportations of Jews from around Poland to the Warsaw Ghetto began. By January of 1943, the time of the diary, about three hundred thousand Jews from the Warsaw Ghetto had died from horrific living conditions or been deported to killing centers. The remaining fifty-five thousand began to fight back. The famous Warsaw Ghetto uprising began in April of 1943 and lasted a month. Unfortunately, in the end, the Jews there were defeated by the Germans.

Throughout this time, many Jews were also living in hiding in the gentile section of Warsaw using forged documents and assumed identities. In July of 1944, with the Russians advancing on Warsaw, the Polish underground agreed that it should liberate Warsaw from the Germans before the Russians arrived. In this way it could secure a more involved role in any provisional government. So in August of 1944, the Polish uprising, also called the Warsaw uprising (not to be confused with the Warsaw Ghetto uprising) began. It was during this Polish uprising that Debora, the diary's author, was killed. By October 1944 the uprising was over and the Poles had lost their battle.

#### Donor

The diary donor, Lusia Hornstein, arrived in the gentile section of Warsaw from Lvov, Poland, in April of 1943 using false identity papers. She lived in a number of different apartments and must have met Debora during this time. In January 1944, Lusia became involved with the Polish underground by delivering newspapers for the Polish government-in-exile. Lusia helped build barricades and acted as a nurse during the Warsaw uprising of 1944. Lusia's story is documented in *At the Fire's Center: A Story of Love and Holocaust Survival* (Peck 1998). Unfortunately, no mention of anyone named Debora is made in this book.

The book does mention that one of the people Lusia lived with was a woman named Krzysia. Lusia describes how Krzysia died during bombing by the Germans during the Polish uprising in 1944. Most Jews living in the gentile section of Warsaw had false identity papers; Lusia's name on her false papers was Marysia. As Debora was consid-

ered a Jewish name, she must have also had a gentile-sounding, Polish name on her false papers. While it is possible that Krzysia could have been Debora's Polish name, we will probably never know for certain.

#### EXAMINATION

The diary fragments are written in black ink on a blue-lined composition paper; sixteen of the fragments have text on both sides, four are blank on one side. The blue lines are barely visible due to fading from heat, either from the bombing of the house or subsequent fire. Each fragment is approximately 3-3/4 x 3 inches. The text runs off various edges of the fragments (see fig. 1); therefore each fragment is actually a piece of a larger document. Most of the fragments had numerous detached pieces and losses to the paper support. Almost all the fragments suffered from varying degrees of fire damage; several fragments are in relatively fair condition and legible (fig. 1), other pieces are charred, brittle, broken, and mainly illegible (fig. 2). Additionally, the paper has become physically distorted from the heat and a number of fragments have fused together in local spots.

The diary came to the conservation lab because the curators wanted to have the text translated, but realized that it was too fragile to be handled. They wanted to know what could be done to expedite the translation of this artifact. One of the first steps was to photograph both sides of each

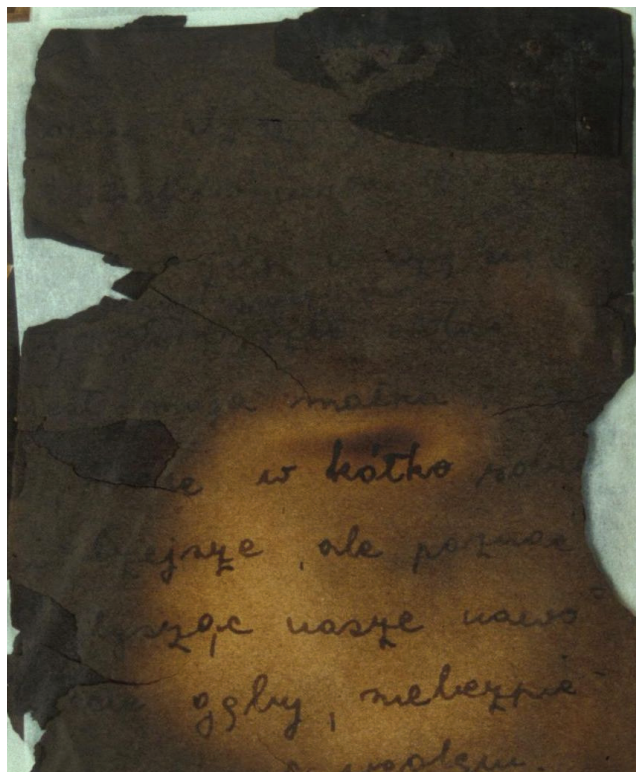


Fig. 2. Example of badly damaged diary fragment, normal light.



page (except for the interior pages of the fragments that were fused together) using a Canon SLR camera, color slide film, and Scandles daylight-balanced fluorescent lights. The fragments were also examined using a hand-held long- and short-wave ultraviolet light lamp and with a hand-held infrared viewer. Unfortunately, neither of these tools allowed for any better legibility of the ink.

#### TRANSLATION

An initial translation was carried out using good quality color photocopies that were made from scans of the color slides. The translation was undertaken by Holocaust survivor and museum volunteer, Manya Friedman. Manya became fascinated with this project and spent numerous hours on this and subsequent translations. The initial translation was fairly incomplete due to the illegibility of the text. Additionally, a number of the words are hyphenated (in Polish two parallel dashes (=) signify a hyphen) and couldn't be adequately translated without knowing their endings. Since any conservation work undertaken would not change the burned and charred appearance, which is now an intrinsic part of the diary's history, another method was needed to enable a more thorough translation.

One option that has been in the news lately is multispectral imaging. Multispectral imaging uses a digital camera, special filters, and computer software to allow imaging of an artifact at any wavelength of light desired. One example of the capability of multispectral imaging is a project undertaken by Brigham Young University (BYU) on carbonized parchment scrolls from Herculaneum in Italy (Booras and Chabries 2001). When BYU purchased their equipment years ago the cost was around \$100,000; however due to the decline in the cost of digital equipment, a similar set-up could be purchased now for around \$40,000. One can get amazing results with multispectral imaging with minimal disturbance to an artifact; however it requires relatively expensive equipment, special software, and user expertise, which was not available at the USHMM.

Instead, inspired in part by Belgium conservators who had used computer enhancement of scanned images to reveal hidden text on documents in the 1990s (Wouters et al. 1999), computer manipulation of the diary fragments from scanned slides and digital images was undertaken. Microsoft Photo

Editor and a freeware program called IrfanView were used to alter the brightness level and contrast, change the individual color balance for red, green, and blue, and alter the saturation level. This manipulation allowed for unending combinations and permutations to a single image and was successful in enabling more lines to be legible for translation (fig. 3).

A second set of images was taken to see if adjustments to the light source would visually enhance the inks. This time the fragments were photographed using a Canon digital camera with both a fluorescent and incandescent light source specular to the surface, rather than an even, normal light. Photographing the images in specular light changed the contrast between the charred areas of paper and the ink enough that the writing became more legible (fig. 4). Extant loose pieces were being matched to the

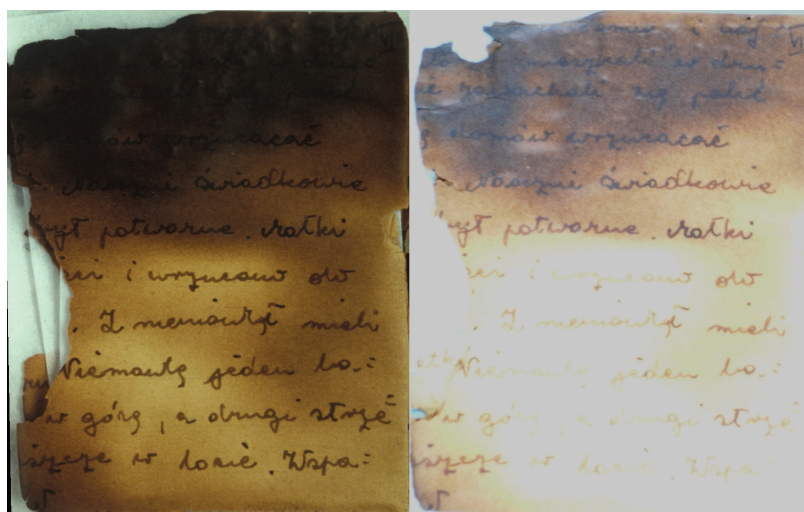


Fig. 3. Diary fragment in normal light on left; computer enhanced image of same fragment on right.

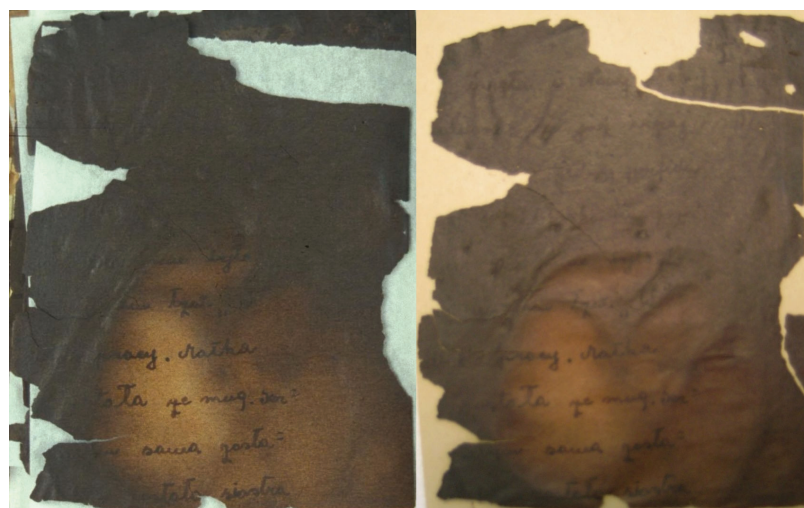


Fig. 4. Diary fragment in normal light on left; same fragment seen in specular light on right.

fragments, which is why the specular light image in figure 4 is more complete on the right. Between adjusting the light source and manipulating the results on the computer, slowly but surely more and more words could be identified. One of the benefits of using digital manipulation was that the fragile original documents were only accessed twice for photography and then were never touched again. All viewing of the artifact and translation work was either done on the computer or from printouts.

Several of the fragments were fused together in discrete areas along the edges. In order for the translation to continue these pieces had to be separated. The pages were too brittle for mechanical separation, so they were immersed in a bath of deionized water and separated while wet. It is interesting to note that the writing became more legible while the paper was immersed due to the change in the refractive index. Digital photographs were taken of the immersed pages and further digital enhancement was not needed to increase legibility for these pieces.

#### MATCHING UP FRAGMENTS

Even with the aid of the manipulated images it was impossible to translate every word since some words are hyphenated and therefore fragmentary. It became important to find if any of the fragments could be matched together using the now legible computer images. The original configuration of the diary probably looked something like the drawing in figure 5 with the paper folded through the center and opening like a book. It is likely that it was folded several more times, to put into hiding for example, and then broken along those fold lines (the dotted lines). Each page would then be made up of four fragments with text running off two edges of each fragment. The most obvious place to begin to find matching pieces were along the top or bottom edges of the fragments where words

were split in half horizontally. Initially, three pairs of fragments were successfully matched up (fig. 6), allowing yet another line of text to be translated in each case.

The four fragments that had writing on only one side were selected to see if they could be matched together since the text did not have to match up on both sides. The fragments with text running off the right edge were placed next to the fragments with the text running off the left edge. Using a Polish dictionary hyphenated words were studied to see if the word endings following after would create an actual word. If they did, an online Polish translator was consulted to see if the full sentences made sense. The online translator was not used to undertake a translation, only to see if sentences made any sense and confirm that the fragments matched together.

Using this technique it was determined that the four fragments did match together to form a full page. Continuing to use a Polish dictionary and the online translator to match up hyphenated words and check meaning, the remaining sixteen fragments were matched together to create four, full, double-sided pages (fig. 7). Once the fragments were matched, the order of the pages could be determined since most of the pages were numbered. What began as a fragment became part of a full page and the translation went from small phrases and partial sentences to an almost complete text.

#### DIARY CONTENTS

The diary is Debora's memory of the day her mother was killed during a Gestapo action in a ghetto. It begins on January 4, 1943, with the Gestapo assuring the Jews there will be no more "actions" (meaning deportations). Debora's father goes to work, but her mother stays home with her. Debora goes into hiding (probably because she did not have a work permit) in a bunker under the veranda which needed to be opened from the outside every hour for air circulation. At 2 p.m. the gendarmes come: "we hear a question directed toward my mother. Is there a shelter here? If we find one then you will be shot on the spot. We do not need to wait long for an answer. My mother's firm voice replies. Very well, if there is a shelter in this house I bet my head."

Debora's mother never comes back to let them out and everyone starts to suffocate. Debora can't stop asking what has happened to her mother and then thinks of killing herself. Finally, another girl goes mad and starts hitting her head on the trapdoor of the bunker causing it to open. Debora goes up to her apartment but her mother is not there. She goes to the window and sees that the ghetto is on fire. "It is getting darker, and the fire intensifies. No one

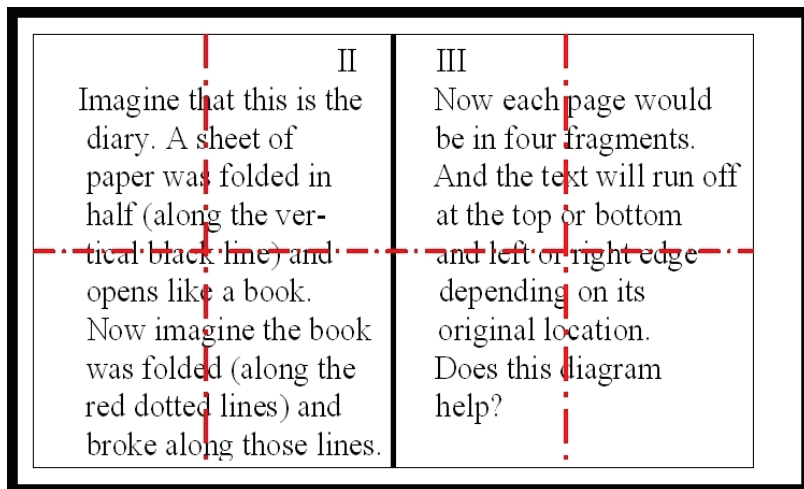


Fig. 5. Diagram of proposed diary configuration.



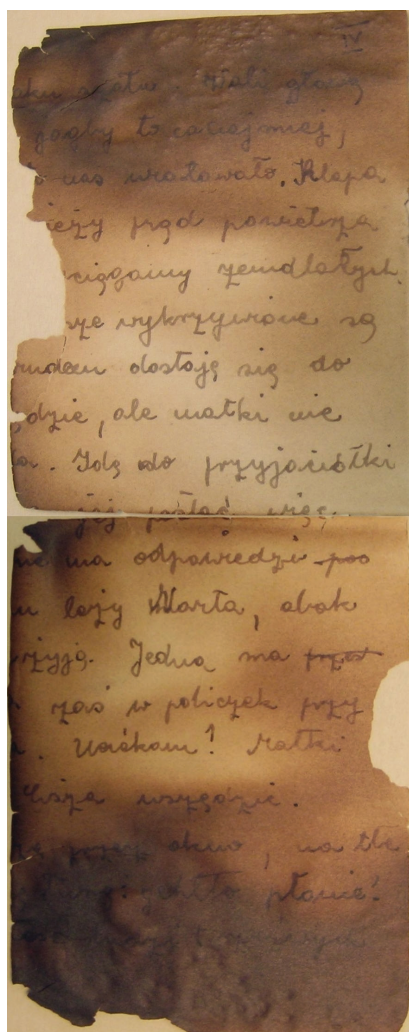


Fig. 6. One pair of matching fragments creating a new line of text where they meet.

can imagine that feeling. To be in a burning ghetto, only among corpses, not knowing what is with mother.”

She goes over to her friend Marta's apartment where Debora finds her mother who has been shot and killed. Her friends tell her what happened. “The first group of gendarmes shot Marta's mother, her cry was heard below. The other group took my mother from the house . . . they entered Marta's apartment. Being drunk they wanted to have some ‘fun.’ Marta started to fight (echoes of the fight were heard below) at this my mother turned to those bandits—leave her alone—what conscience do you have to take advantage of such a young girl . . . the answer was a shot which my mother received. . .”

At this time, it is unclear which ghetto Debora was writing about, but somehow she made it out and came to the gentile section of Warsaw, where she met and lived with Lusja Hornstein. Although she was killed during the

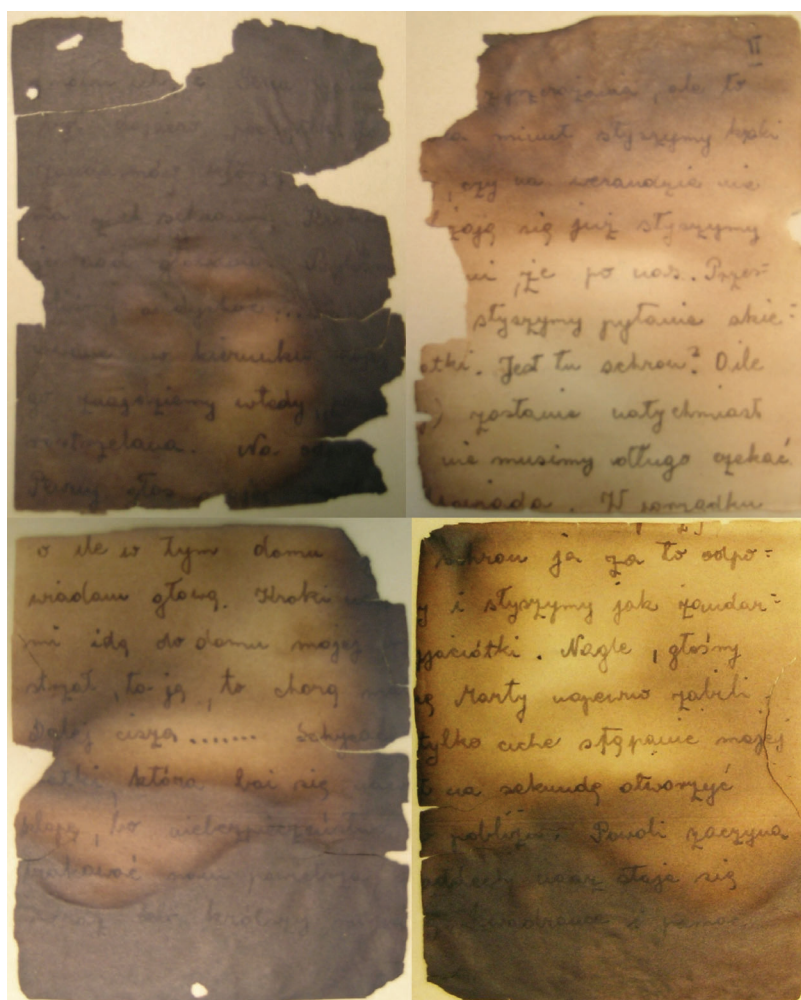


Fig. 7. Example of four fragments matched together creating one full page.

Polish uprising, her written testimony of the death of her mother lives on in this small diary.

“Father understood even better than I, he knew one thing, that remaining in the ghetto is a certain death.”

## CONCLUSION

This project is a great example of how inexpensive, readily available computer technology can be used to recover information from an artifact, without endangering the artifact itself. Varying light sources during photography, coupled with manipulation of the digital images, allowed for almost all of the illegible words to be seen, and enabled the matching up of fragments into full pages.

Research and conservation treatment of the diary will continue. Pages that are not so charred and brittle will be mended. After testing, the more brittle and fragile pages might be sized. In any case, even after any treatment, the diary will remain in very fragile condition. The focus will

then be on creating a housing that will allow for its safe storage.

We may never learn anything more about Debora, her family, or what happened to them. The diary, composed of only nine, small, written pages, gives only a glimpse of the horrors perpetrated during the Holocaust, but it will remain as a very moving and poignant relic of a terrible time.

#### ACKNOWLEDGMENTS

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#### EQUIPMENT

Spectroline Model Q-22NF hand-held UV lamp: long-wave UV at 365 nm, short-wave UV at 254 nm.

Find-R-Scope IR viewer: 940 nm infrared emitting diode, sensitivity from 350-1300 nm (peak at 800 nm).

#### REFERENCES

- Booras, S. W., and D. Chabries. 2001. The Herculaneum scrolls. In *PICS 2001: image processing, image quality, image capture systems conference*, 215–218. The Society for Imaging Science and Technology (IS&T) Conference, Montréal. Springfield, VA: IS&T.
- Harran, M., D. Kuntz, R. Lemmons, R. A. Michael, K. Pickus, and J. Roth. 2000. *The Holocaust chronicle*. Lincolnwood, IL: Publications International, Ltd.
- Peck, J. M. 1998. *At the fire's center: A story of love and Holocaust survival*. Chicago: University of Illinois Press.
- Wouters, J., O. Depauw, and V. Sizaire. 1999. Conservation of the archives on the deportation of the Jews from Belgium: Revelation of hidden information by a combination of photography, scanning, digital image treatment, and printing. In *ICOM Preprints*. International Council of Museums 12th Triennial Meeting, Lyon, 539–542. Paris: ICOM Committee for Conservation.
- www.poltran.com (online translator accessed 8/2004–5/2005).

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