

Beth Antoine
INF 389N: Seminar in Forged Historical Documents
February 15, 2007
Dr. Gracy, Instructor

History, Handwriting, Paper, and Media: Running Ink, Pens, and Pencils

Daniels, Maygene. "The Ingenious Pen: American Writing Implements from the Eighteenth Century to the Twentieth." *The American Archivist* 43 (1980): 312-24.

Dube, Liz. "The Copy Pencil: Composition, History, and Conservation Implications." *The Book and Paper Group Annual* 17 (Fall 1998).
<http://aic.stanford.edu/sg/bpg/annual/v17/bp17-05.html> (accessed Feb. 1, 2007).

Eusman, Elmer. *The Ink Corrosion Website*. European Commission on Preservation and Access in Amsterdam, <http://www.knaw.nl/ECPA/ink/intro.html> (accessed February 2, 2007).

The Handbook of Texas Online. Texas State Historical Association and the General Libraries at the University of Texas at Austin, 1999, (revised March, 2003),
<http://www.tsha.utexas.edu/handbook/online/index.html> (accessed Feb. 2, 2007).

Hilton, Ordway. "Can the Forger Be Identified from his Handwriting?" *The Journal of Criminal Law, Criminology and Police Science* 43, no.4 (1952): 547-555.

Hilton, Ordway. "Pencil Erasures. Detection and Decipherment." *The Journal of Criminal Law, Criminology and Police Science* 54, no.3 (1963): 381-386.

Hunter, Dard. *Papermaking: The History and Technique of an Ancient Craft*. New York: Knopf, 1943.

Mathyer, Jacques. "The Influence of Writing Instruments on Handwriting and Signatures." *The Journal of Criminal Law, Criminology, and Police Science* 60, no.1 (1969): 102-112.

Morris, Ron N. *Forensic Handwriting Identification: Fundamental Concepts and Principles*. San Diego: Academic Press, 2000.

Pines, Charles C. "The Story of Ink." *The American Journal of Police Science* 2, no.4 (1931): 290-301.

Printing, Printing Inks, Typography, Typewriting, Dating Paper, Photography, and Diplomatics

Chappell, Warren. "Type: Cutting and Casting." In *A Short History of the Printed Word*, 38-57. New York: Alfred A. Knopf, 1970.

Dowding, Geoffrey. *Introduction to the History of Printing Types: An Illustrated Summary of the Main Stages in the Development of Type Design from 1440 up to the Present Day, An Aid to Type Face Identification*. Clerkenwell, UK: Wallace & Company, 1961.

Gupta, Sia Ram. "Identification of Letterpress and Halftone Printing." *The Journal of Criminal Law, Criminology, and Police Science* 57, no. 1 (1966): 112-114, <http://links.jstor.org/sici?sici=00220205%28196603%2957%3A1%3C112%3AIO%3E2.0.CO%3B2-O> (accessed February 18, 2007).

Hlasta, Stanley C. *Printing Types & How to Use Them*. Pittsburgh, PA: Carnegie Press, 1950.

Lacy, Lucile P. "Modern Printing Processes." *The Journal of Criminal Law, Criminology, and Police Science* 47, no. 6 (1957): 730-736, <http://links.jstor.org/sici?sici=00220205%28195703%2F04%2947%3A6%3C730%3AMPP%3E2.0.CO%3B2-7> (accessed February 18, 2007).

Swett, George G. "The Dating of Typewriting." *The Journal of Criminal Law, Criminology, and Police Science* 50, no. 1 (1959): 86-88, <http://links.jstor.org/sici?sici=00220205%28195905%2F06%2950%3A1%3C86%3ATDOT%3E2.0.CO%3B2-B> (accessed February 15, 2007).

Thurston, Herbert. "Papal Diplomatics." In *The Catholic Encyclopedia*. New York: Robert Appleton Company, 1909. <http://www.newadvent.org/cathen/05021a.htm> (accessed March 1, 2007).

Vasistha, S.K. and S.C. Vasistha. "Three Chemical Tests for Comparing the Age of Paper." *The Journal of Criminal Law, Criminology, and Police Science* 53, no. 1 (1962): 120-121, <http://links.jstor.org/sici?sici=0022-0205%28196203%2953%3A1%3C120%3ATCTFCT%3E2.0.CO%3B2-Y> (accessed February 18, 2007).

Wolfe, Herbert Jay. *The Manufacture of Printing and Lithographic Inks*. New York: MacNair-Dorland Co., 1933.

Woodward, Richard B. "Too Much of a Good Thing: Photography, Forgery, and the Lewis Hine Scandal." *Atlantic Monthly* 291 (June 2003): 67-72, 74-76.

Daniels, Maygene. "The Ingenious Pen: American Writing Implements from the Eighteenth Century to the Twentieth." *The American Archivist* 43 (1980): 312-24.

Daniels gives an account of the history of the development of writing implements in America. He describes in detail each of the major developments in the evolution of these tools from the quill through the typewriter. Understanding the details of the designs of the various types of pens helps explain the differences in the markings they make. Recognizing these differences can aid in identification of these markings on questioned documents. For example, Waterman's use of capillary attraction in the design of his fountain pen afforded the pen greater control of ink flow. This improvement in control led to fewer accidental ink spots and more fluid markings. Daniels discusses the history of the typewriter and its impact on the tradition of writing. He describes the invention as a major break from the tradition of writing, pointing out that it changed the appearance of the document forever. He also gives a brief account of the development of the modern keyboard. Daniels also gives an interesting account of early copying techniques such as a contraption that held two quills and the letter copying press. Thomas Jefferson used a device similar to the former. At the time of publication, Daniels was an archivist in the Office of Presidential Libraries, National Archives Records Administration. A version of this paper was presented at the convention of the Society of American Archivists of 1979.

Dube, Liz. "The Copy Pencil: Composition, History, and Conservation Implications." *The Book and Paper Group Annual* 17 (Fall 1998).
<http://aic.stanford.edu/sg/bpg/annual/v17/bp17-05.html> (accessed Feb. 1, 2007).

This article examines the medium of the copying pencil, also known as the ink pencil or indelible pencil. Dube describes the history, uses, and chemical composition of the copying pencil. Observations of tests performed on their markings and the implications of her findings are discussed. The copying pencil was first introduced in the 1870's for use with letterpress copying techniques. It was later used more commonly as a pencil that was more permanent, as it cannot be erased with a rubber eraser. The copying pencil is composed of graphite, clay, and a colorant. The colorant is usually an aniline dye, most commonly methyl violet, which is soluble in water and alcohol. The solubility of the medium can cause problems for conservators, but can also aid in its identification. Dube describes in detail the technique of copying with letter copying books and how to identify the copying pencil medium on paper. Because the dye is solubilized during the copying process, the markings appear feathered with a pronounced blue or violet color typical of some pen markings, but they have the width more typical of pencil markings. Dube warns that the medium cannot always be identified by visual examination, and therefore, thorough testing should be performed on pencil markings before treatment is attempted. At the time of publication, the author was a Conservator at the University of Notre Dame Libraries. Although the *Book and Paper Group Annual* is not a peer-reviewed journal, it is highly regarded in the field of paper conservation.

Eusman, Elmer. *The Ink Corrosion Website*. European Commission on Preservation and Access in Amsterdam, <http://www.knaw.nl/ECPA/ink/intro.html> (accessed February 2, 2007).

The Ink Corrosion Website is a comprehensive resource for information about iron gall ink hosted by the European Commission for Preservation and Access (ECPA). From history to conservation, it addresses all aspects of iron gall ink from a preservation perspective. Because iron gall ink was a popular writing ink for a long period of history, and it has self-destructive qualities, its preservation is an important and difficult problem facing the preservation community today. This site is an absolute wealth of information. It contains ink recipes, current and proposed conservation methods, conservation research, and links to many other ink resources. The site provides an explanation of the chemistry of iron corrosion and its interaction with paper that is both understandable and thorough. There are many problems with the treatment of ink corrosion because of the complexity of the chemical reactions involved. Currently, there is no perfect solution, and in fact, many conservators rely solely on preventive measures to care for affected collections. The site also contains a searchable list of 337 publications of ink corrosion, its causes, and treatments, as well as summaries of the related research currently underway in institutions worldwide. Elmer Eusman is the project coordinator as well as a contributing author of the site. He is the Senior Paper Conservator at the Library of Congress and is highly regarded by the field of paper conservation as one of the leading researchers in the subject of ink corrosion and its effects on paper. Virtually all researchers reference this site when investigating issues concerning iron gall ink and ink corrosion.

The Handbook of Texas Online. Texas State Historical Association and the General Libraries at the University of Texas at Austin, 1999, (revised March, 2003), <http://www.tsha.utexas.edu/handbook/online/index.html> (accessed Feb. 2, 2007).

The Handbook of Texas Online is an encyclopedic collection of articles on all things Texan. It is a joint project of the General Libraries at the University of Texas at Austin and the Texas State Historical Association. The site is searchable by title, subject, historical period, location, and keyword. The articles include concise descriptions of the historical landscape and detailed accounts of the lives of historical figures of Texas. Of particular interest are the historical overviews of the Texas Revolution and the Republic of Texas, and the biographies of historical figures such as Barnard Bee. Bee moved to Texas from South Carolina in 1836 after the Battle of San Jacinto. He became the Secretary of the Treasury, and later, Secretary of State of David Burnet's government. He then became Secretary of War under Sam Houston and served as Secretary of State under Mirabeau Lamar. The Handbook also contains a detailed history of the printing of Texas newspapers including descriptions of the types and machinery used as well as the players involved. The articles are written by volunteer contributing authors and are selected by the staff of the Historical Association. The Historical Association first conceived the Handbook in 1939. It has been printed in several editions and was finally converted to the current online version in 1999. It is continuously updated and corrected.

Hilton, Ordway. "Can the Forger Be Identified from his Handwriting?" *The Journal of Criminal Law, Criminology and Police Science* 43, no.4 (1952): 547-555.

Ordway Hilton addresses the issue of discovering the identity of a forger through handwriting identification of a forged document. He describes this issue as the most difficult handwriting problem and as the one that causes the most error on the part of the handwriting expert. His explanation of this claim is that the best way to disguise one's handwriting is to attempt to imitate another's. Hilton distinguishes two types of forged signatures: those that attempt to imitate, and those that do not attempt to imitate. The forger can often be identified in the later type, but identification is unlikely in the former. Of the types that attempt to imitate, there are two types: traced and freehand. If traced, the identification of the forger is impossible, but it can often be identified as inauthentic. Because the signature is drawn, not written, there is no evidence of the writing habits of the forger, but the writing appears slow and unnatural. If the signature is imitated freehand, identification of the forger is possible, but rare. Hilton provides two requirements for the establishment of the identification: the signature must be in the forger's natural hand, and a large quantity of the forger's handwriting must be available for comparison. To make the identification, Hilton instructs the examiner to compare personal writing habits, not just general writing habits. Also the examiner must base the identification on more than just one or two common writing habits, and any differences in writing habits must have a logical explanation. At the time of publication, Ordway Hilton was an Examiner of Questioned Documents with fourteen years of experience. He was a handwriting specialist for the Naval Intelligence Service during World War II. This article was presented at the 1952 meeting of the American Academy of Forensic Sciences.

Hilton, Ordway. "Pencil Erasures. Detection and Decipherment." *The Journal of Criminal Law, Criminology and Police Science* 54, no.3 (1963): 381-386.

Ordway Hilton explains that complete erasure is much less common and much more difficult than is commonly believed. He lists methods of erasure, describes what may be left behind, and provides methodology for the detection and decipherment of erasures. One method of erasure is the application of hydrogen peroxide to the media to loosen the carbon fibers from the paper before using a rubber eraser. Two things that may be left behind an erasure are fragments of carbon wedged between paper fibers and an indentation or track of the original line of writing. In order to detect an erasure, the examiner should use diffused daylight (especially North light) and position the document in order to achieve transmitted or raking light in his visual examination. The document should be viewed from all angles and the verso should be examined to detect any indentation. Erasure can create these spots in the paper and can cause differences in the reflectance quality or color of the paper. If an erasure is not detectable by visual examination, another method is to place a piece of highly polished, well-cleaned silver on the paper. Any rubber residue from the erasure will tarnish the silver. For deciphering

erasures, Hilton recommends using photographic methods in addition to the visual methods described earlier, as they allow manipulation of the visual examination, namely increasing contrast. Only low magnification should be used. He describes the method of “aging” the document - by allowing it to sit, dust may collect in the indentation. At the time of publication, Ordway Hilton was an Examiner of Questioned Documents and had served as president of both the American Society of Questioned Document Examiners and the American Academy of Forensic Sciences. This paper was presented at the 1962 meeting of the American Society of Questioned Document Examiners.

Hunter, Dard. *Papermaking: The History and Technique of an Ancient Craft*. New York: Knopf, 1943.

Dard Hunter discusses in detail all aspects of the history of papermaking, as well as techniques and materials used in papermaking. This source is considered by many to be the foremost authority on the subject. Hunter chronicles the craft from ancient writing surfaces through the invention of paper, the changes brought about by printing processes, and through the invention of machine-made paper. Hunter also describes watermarking techniques and designs with many illustrations. Of particular interest are the chapters on the early papermaking machines and the changes in papermaking brought about by the invention of the printing press. With the ability to produce large quantities of paper quickly and the growing hunger to print on that paper, the supply of rags to produce the pulp became a problem. This shortage caused a search for a new material for paper production and the beginning of wood as the most commonly used material for papermaking. The Chronology of Papermaking, Paper, and the Use of Paper, which appears in the end of the text, is particularly useful as a quick reference for the document examiner. The chronology contains concise descriptions of the major developments in the craft of papermaking and the use of its product.

Mathyer, Jacques. “The Influence of Writing Instruments on Handwriting and Signatures.” *The Journal of Criminal Law, Criminology, and Police Science* 60, no.1 (1969): 102-112.

Mathyer addresses the often-argued issue of whether writing instruments impact personal writing habits. Should document examiners compare writing samples that were written with different types of writing instruments? He begins the article by describing several writing instruments and comparing their characteristics. He describes the hardness, sharpness, and flexibility of the points of pencils, and four types of pens, the steel-nibbed, fountain, ballpoint, and fiber tip pens. After performing detailed experiments Mathyer concludes that although it is preferable to compare handwriting using the same instrument, it is not necessary. The form and line quality of handwriting is not modified by the writing instrument if it works properly. He also observes that a writer needs less space to write the same amount using an instrument with a harder, sharper point, and a writer makes fewer lifts when using a pencil and more when using a fiber pen. Mathyer warns that there are always exceptions to these observations.

Mathyer holds degrees in both Criminalistics (Police Science) and Criminology. In 1963 he became Professor and Director of the Institut de Police Scientifique et de Criminologie of the University of Laussane, Switzerland. He has served as an advisor to the International Criminal Police Organization.

Morris, Ron N. *Forensic Handwriting Identification: Fundamental Concepts and Principles*. San Diego: Academic Press, 2000.

Morris' analysis of handwriting identification can truly be used as a how-to guide for the examiner of questioned documents. He describes the different elements that contribute to individual handwriting and explains how an investigator can use these elements to compare handwriting samples and determine authenticity. In the handwriting systems section, Morris describes how the teaching of handwriting has changed over time and how the manner in which an individual was taught affects characteristics of his handwriting. He explains that it is important to distinguish class characteristics, handwriting characteristics common to a group, from individual handwriting characteristics. Handwriting identification is complicated by the fact that although no two people write exactly alike, no one person writes exactly the same twice. Using many examples, Morris illustrates the differences between various characteristics and how to interpret the commonalities and differences between handwriting samples. Ron Morris is certified by the United States Secret Service Forensic Sciences Division and the American Board of Forensic Document Examiners. He has worked as an examiner of questioned documents for the United States Secret Service, the United States Treasury, and the Metropolitan Police Department in Washington, DC.

Pines, Charles C. "The Story of Ink." *The American Journal of Police Science* 2, no.4 (1931): 290-301.

Pines offers a concise introduction to the history of ink with detailed descriptions of the components and characteristics of the inks. He defines writing ink as "fluid substances containing coloring matter either in solution or suspension and commonly in both conditions that can be used with a pen to mark letters, characters or other designs on any surface prepared to receive it" (p. 294). Pines also discusses unusual inks like secret or sympathetic ink, which is invisible until developed with a particular substance by the recipient. An early type of secret ink was used during the Indian Mutiny of 1857. It was made of rice starch and developed with iodine. The most common form of secret ink is made from cobalt chloride. It turns from pale pink to blue when warmed. His description of the Ink River is also fascinating. The natural phenomenon of the formation of iron tannin ink, which occurred in a stream in Algeria, was caused by the chemical interaction of water from two feeder streams. One stream contained iron, while the other contained tannin. The reaction of these and the oxygen in the water created black ferric tannate. This article was presented at the Philadelphia College of Pharmacy and Science in 1930 and was also printed in the American Journal of Pharmacy. The editor makes

special note the bibliography, describing it as a list of the best sources on the subject. One of these sources is *Forty Centuries of Ink* by David Carvalho.

Chappell, Warren. "Type: Cutting and Casting." In *A Short History of the Printed Word*, 38-57. New York: Alfred A. Knopf, 1970.

Chapter 3, "Type: Cutting & Casting" provides a detailed description of the process of letterpress printing from designing the type to pressing the ink onto the paper. Chappell described two methods of designing a typeface, the calligraphic method and the sculptural method. The calligraphic method involves writing long passages and choosing particularly well-formed letters for use as models to copy directly. Although the sculptural method also uses calligraphy as a model, the letters are not copied exactly. It is a more organic process, as the final form of each letter results from sculpting and filing its shape throughout the process of forming the punch. The typeface designed by Gutenberg for his 42-line Bible is believed to consist of no less than 290 different characters. This great number of characters is due to his extensive use of ligatures in an effort to mimic the many common letter connections found in calligraphy. The practice of designing typefaces in this manner was short-lived as it was too labor intensive to design the font and to compose type. Type was traditionally stored in two cases, which were arranged with the capitals in one case and the small letters in the other. This arrangement is the source of the terms "upper case" and "lower case" letters. Warren Chappell was an illustrator, typographer, and type designer. He studied and worked as a punch cutter and type designer with Rudolf Koch in Germany before becoming an instructor at the Arts Students League in New York.

Dowding, Geoffrey. *Introduction to the History of Printing Types: An Illustrated Summary of the Main Stages in the Development of Type Design from 1440 up to the Present Day, An Aid to Type Face Identification*. Clerkenwell, UK: Wallace & Company, 1961.

Dowding provides an illustrated chronological history of the development of typefaces. The earliest of which were designed and hand-cut by printers and modeled after formal German manuscript handwriting. This early style, called Gothic or Blackletter, appeared around 1440. Pages were commonly set leaving room in the margins for decorative illuminations. As the art of printing spread throughout Europe, new typefaces emerged. In Italy, as printers began modeling their designs on the popular and more readable handwriting style, Caroline miniscule, the Roman typeface was born. By the end of the 16th century, Claude Garamond's Roman was the standard type used across Europe. Italic was originally a font in its own right. Entire books were set in italics to save space, as the letters are more compact than Roman letters. Italic types are modeled from cursive handwriting of which simplified, joined, and slanted letters are characteristic. An early form of the printed book, the block book, was printed using woodblock printing from circa 1420. Complete pages of text and images were carved and printed individually. The pages were then glued back-to-back and bound. As this

process was quite laborious, an improved method was sought and was replaced by the invention of moveable type around 1440.

Gupta, Sia Ram. "Identification of Letterpress and Halftone Printing." *The Journal of Criminal Law, Criminology, and Police Science* 57, no. 1 (1966): 112-114, <http://links.jstor.org/sici?sici=00220205%28196603%2957%3A1%3C112%3AIO LAHP%3E2.0.CO%3B2-O> (accessed February 18, 2007).

Gupta discusses a method for the identification of the press from which a questioned letterpress document was printed. Identification should be based on "the existence of an adequate combination of class and individual characteristics exceeding the limit of an accidental coincidence." Class characteristics include the style and size of the typefaces conforming to the specifications of the manufacturer. The body size of a typeface creates the width of a line and the depth of a column. The standard unit of measurement of the body size is the point, and type varies from 6 to 72 points. 12 points equal one pica, and 6 picas equal one inch. Individual characteristics include defective setting and imperfections of type. Defective setting of type can result in differences in relative spacing, alignment, slant, and weight of characters. Imperfections of type can result from wear and tear or mutilation of type. Examination by this method requires the availability of a standard or proof of the questioned document or the form that the document was printed from. Because the act of setting the type cannot be reproduced exactly the same way twice, it may not be possible to identify the press from the type if it is not composed in the exact manner of the questioned printing. A variation of this methodology can be applied to questioned halftone printed documents. Sia Ram Gupta was an instructor at the Central Police Training College, Mt. Abu, India. From 1950 to 1961, he was the chief handwriting expert for the state of Uttar Pradesh.

Hlasta, Stanley C. *Printing Types & How to Use Them*. Pittsburgh, PA: Carnegie Press, 1950.

Hlasta provides illustrations of typefaces, identifies their distinguishing characteristics, and describes their history and common uses. Of particular interest is the introduction, which illustrates and provides nomenclature for the elements of moveable type and the fundamental structures of typefaces. The physical constraints of the process of printing with moveable type create the rules for how typefaces are designed and used. In the United States, all type is cast to 0.918 inch high, no matter what font or point size. The position of the nick is used to identify to which font a piece of type belongs. The fundamental structures of typefaces include elements such as the stem, hairline, head, foot, arc, bowl, serif, tail, arms, bars, nicks, and links. All elements are illustrated, and the various forms of the elements are shown side by side. Swash letters are letters such as Q, R, M, and N with flourished terminals or tails. The fundamental structures are further illustrated by the comparison of several typefaces of the same letter. For example, the Garamond "P" is distinctly different from the Nicholas Cochin "P." The former has a

biased bowl and a bracketed head-serif. The latter has a smaller biased bowl that is not closed to the head of the stem, and it has a wedged, hairline head-serif.

Lacy, Lucile P. "Modern Printing Processes." *The Journal of Criminal Law, Criminology, and Police Science* 47, no. 6 (1957): 730-736,
<http://links.jstor.org/sici?sici=00220205%28195703%2F04%2947%3A6%3C730%3AMPP%3E2.0.CO%3B2-7> (accessed February 18, 2007).

Lacy describes five basic printing methods; relief, planographic, intaglio, stencil, and photography; and compares their identifying characteristics. Relief printing, which includes letterpress, involves inking raised surfaces and pressing them directly onto the paper. There are three types of relief printing presses. The platen or flatbed press is usually shaped like a clamshell with the paper on one side and the type on the other. The cylinder press rolls the paper around a cylinder and across the type. In a rotary press, the paper passes between two cylinders, one of which is covered with curved type. The planographic printing method employs an inked, chemically treated, level plate. In intaglio printing, the image is carved into the printing surface, and ink is flooded into these crevices. Stencil involves the application of ink through holes in a decoratively cut sheet. Photography uses light instead of ink to imprint the paper. Some characteristics of various printing methods follow. The edges of letterpress letters appear more sharply defined and are less irregular than those of offset, a type of planographic printing. Unlike offset, letterpress printing leaves an impression on the paper and usually exhibits an accumulation of ink around the edges of the letters. A planographic method, engraved stone lithography, also generates sharper, finer, and more detailed printing than offset. Engraving, a type of intaglio printing, exhibits letters that appear raised and the paper shows evidence of stretching en verso. Multigraph printing appears quite similar to letterpress if the type is inked directly. If an inked ribbon is employed, multigraph appears more like typewriting, less crisp and having dots of ink between letters. Lacy is a graduate of the University of Houston, and at the time of publication, was an Examiner of Questioned Documents in that city.

Swett, George G. "The Dating of Typewriting." *The Journal of Criminal Law, Criminology, and Police Science* 50, no. 1 (1959): 86-88,
<http://links.jstor.org/sici?sici=00220205%28195905%2F06%2950%3A1%3C86%3ATDOT%3E2.0.CO%3B2-B> (accessed February 15, 2007).

Swett explains that it is sometimes possible to determine the authenticity of a document by examination of its typewriting. This is most commonly possible by proving that the typewriter used was not yet invented by the purported date of the document. Three elements to examine when dating typewriting are type design, type defects, and dirty type faces. Over time, manufacturers of typewriters have changed the design of characters or of entire fonts. Continued usage of a machine can cause defects in the typeface or alignment. The timing of the development of defects varies with the quality of the machine, as well as with the amount of usage and the typist involved. If

chronological samples are available, a timeline of the development of the defects may be established. This chronology can then be used to date the questioned document. When using type defects to date a document, the examiner must be certain of which machine was used to create the document. The examiner must also be careful not to be misled by previous repair or replacement of defects. If left unclean, the loops of letters can become filled with dirt, erasure crumbs, and ribbon residue. These loops can begin to print as solids. For example, an “o” may begin to print as a solid circle. As with type defects a chronology may be established for dating purposes. The examiner should also note that if this element is not consistent throughout the document, portions of it may have been written at different times. At the time of publication, George Swett was an examiner of questioned documents in private practice in St. Louis, Missouri and was a member and officer of the American Society of Document Examiners. He had previously worked for the U.S. Postal Inspection Service.

Thurston, Herbert. “Papal Diplomats.” In *The Catholic Encyclopedia*. New York: Robert Appleton Company, 1909. <http://www.newadvent.org/cathen/05021a.htm> (accessed March 1, 2007).

Because forgery became quite common during the Middle Ages, precautions began to be taken concerning the authenticity of Papal Bulls, royal charters, and other official documents. The chancery of the Holy See took such precautions as not using a seal if there was concern that it may be used for fraudulent purposes. Although Innocent III began the development of instructions for the detection of forgery, medieval document examination practices were not sufficient. Thurston explains that in papal diplomatics, it is necessary to understand the process and people involved in the creation of papal documents. The chancery includes all of the officials involved in the preparation of the documents, but the constitution of the chancery and the roles of the officials varied over the course of history. It is also important to note that besides the chancery of the Holy See, each bishop also had a chancery. Other matters to examine in papal documents include the text of the document, the manner of dating, signatures, attestations of witnesses, seals and the attachment of those seals, writing material and its method of folding, handwriting, and Tironian or shorthand notes. This article was published as part of the Catholic Encyclopedia, which is an authoritative source of information on the history and doctrine of the Catholic Church. The encyclopedia was edited by a group of five scholarly members of the Catholic Church affiliated with the College of the City of New York, Catholic University, and *The Messenger*.

Vasistha, S.K. and S.C. Vasistha. “Three Chemical Tests for Comparing the Age of Paper.” *The Journal of Criminal Law, Criminology, and Police Science* 53, no. 1 (1962): 120-121, <http://links.jstor.org/sici?sici=0022-0205%28196203%2953%3A1%3C120%3ATCTFCT%3E2.0.CO%3B2-Y> (accessed February 18, 2007).

Vasistha and Vasistha outlines an experimental procedure, which concluded that by examining certain properties of paper, it is possible to determine its approximate age. When other methods fail, the chemical analysis of paper may aid in dating a questioned document. The study showed that “the acidity of paper and its capacity of absorbing bromine in tetrachloride solution in the cold increases, but its resistance to the action of nitric acid decreases during the natural aging of paper.” By comparing these properties of the paper of a questioned document with those of paper of known age, a document examiner can distinguish the approximate age of the questioned document. At the time of publication, S.K. Vasistha was the senior-most lecturer at the College of Science of Banaras Hindu University, Banaras, India, where he taught organic chemistry. S.C. Vasistha was also a chemistry teacher and the head of the Chemistry Department of J.P. Mehta Municipal Intermediate College, Varanasi, India.

Wolfe, Herbert Jay. *The Manufacture of Printing and Lithographic Inks*. New York: MacNair-Dorland Co., 1933.

Wolfe includes historical and technical information about printing inks, as well as instruction for their manufacture. Of particular interest are the first two chapters. The former provides a chronology of the development of printing ink, while the latter describes the various types of printing inks and compares their composition and characteristics. The earliest printing inks were made by printers and were usually a mixture of lampblack and linseed oil varnish. Inks began to be manufactured and sold to printers in the sixteenth century. In 1856, William Perkin discovered mauve, the first of the coal-tar colors. This discovery led to the development of many colored inks. Wolfe describes printing ink as a mixture of pigments, oils, varnishes, driers, and waxy or greasy compounds. This mixture must have an appropriate balance of cohesion and adhesion in order to both work well on the press and adhere to the paper. It must also dry quickly enough to avoid being smudged. Three distinct classes of inks correspond to their respective printing methods: typographic or relief printing, planographic, and intaglio inks. The composition of inks depends on the characteristics required by the method of printing that will be used. For example, intaglio ink used for hand printing of fine engravings should be short, buttery, and should dry by the oxidation of the vehicle. It must be greaseless so that it can be wiped off of the plate surface without disturbing ink in the crevices, but will lift onto the paper. It also must be insoluble in water because the paper is usually damp during printing. The Forward was written by Allen Rogers, Ph.D., the author’s former teacher. Rogers served as Head of the Department of Chemical Engineering of the Pratt Institute, Brooklyn, New York.

Woodward, Richard B. “Too Much of a Good Thing: Photography, Forgery, and the Lewis Hine Scandal.” *Atlantic Monthly* 291 (June 2003): 67-72, 74-76.

Through the story of the forgery of historic Lewis Hine photographs, Woodward discusses several issues regarding photography and the difficulties associated with its authentication. The reproducible nature of photography complicates the matter of

authenticity and provides ample opportunity for forgery. When questioning the authenticity of vintage photography, red flags to be aware of include a sudden flooding of the market of a rare print without an acceptable explanation, inappropriate or lack of appearance of age, and any variation in ink or the placement of a signature. Paper conservator, Paul Messier used three methods for dating the questioned photographic prints. He found the date of the paper manufacturer's logo stamped on the back of the print, he detected optical brighteners in the paper by its florescence under UV light, and he employed for comparison a known chronology of photography paper fibers under microscopic magnification. Research for this article included the consultation of several experts in the fields of conservation and history of photography. The author interviewed Grant Rover, head of the conservation department of the George Eastman House; Paul Messier, a paper conservator of Boston; and Anne Tucker, Curator of Photography at the Museum of Fine Arts, Houston.