

Ink and Writing Instruments

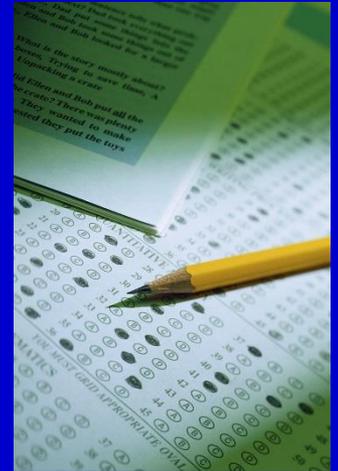
Kathie Koppenhaver

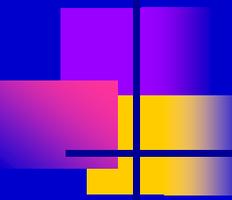
Ink

Writing is applied to a surface by adhesion or absorption.

Pencil adheres to paper.

Ink is a writing fluid that is absorbed into paper.





Ink



50 B.C. Reed pen from calamus plants.



Ink

56 B.C. The quill pen came into use with feathers of geese, and other fowl.

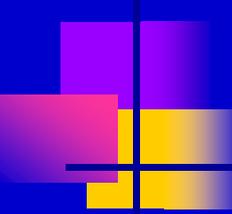
Latin for feather is penna, thus the writing instrument was named the pen.



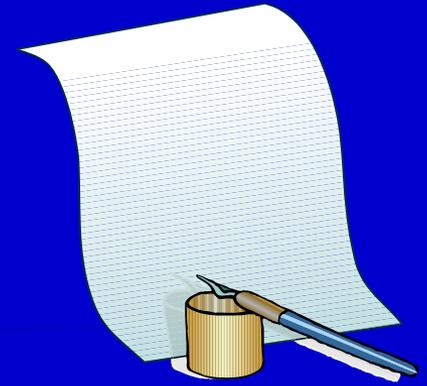
Ink

The penknife was used to sharpen the quills when they lost their sharpness.





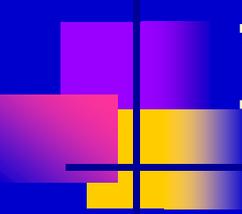
Ink



1650: The first pen carrying its own ink supply was invented.

Some pens were made of metal such as bronze, steel, iron, silver or gold.

1748: Steel pen nibs were first manufactured in France.



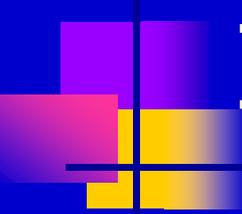
Ink



1884: Lewis E. Waterman patented the first fountain pen in the USA.

Pens had to be filled with an eyedropper.

1913: W.A. Sheaffer developed the lever-fill fountain pen.



Ink

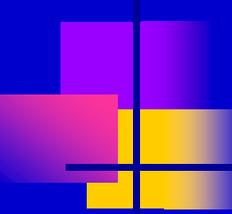


1888: The first ballpoint pen was patented.

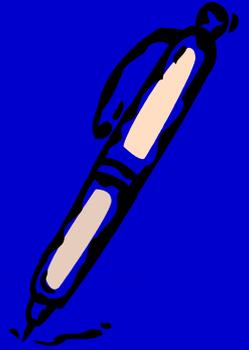
1945: The ballpoint pen revolutionized writing instruments.

1951 Felt tip markers were introduced.

1979: The Paper Mate Company began marketing Eraser Mate, an erasable ink pen.



Ink



1963: The first fiber tip pens were manufactured.

1963: The first roller ball pen also made its debut.

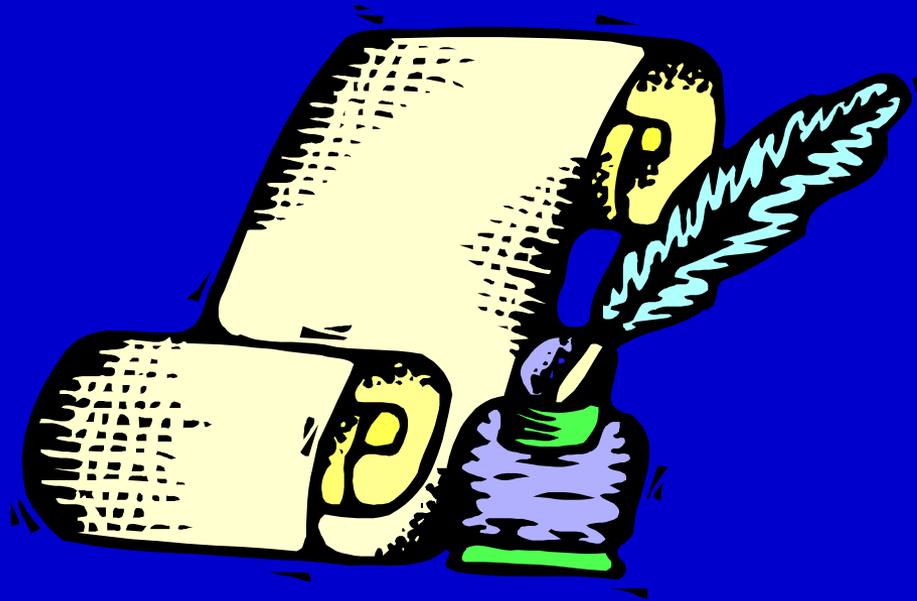
1980: Disposable fountain pen.

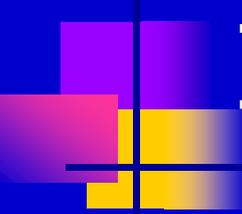
1988: First waterproof roller ball pens.

1991: Gel pens appeared on the market.

Ink

Writing fluid was needed for each type of writing instrument.



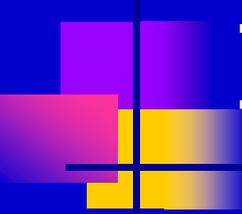


Ink

The earliest ink was carbon ink also known as India Ink.

Ink consists of carbon cakes converted into liquid by grinding the cake in water-glue medium.

Carbon inks use a shellac-based binder. Most stable – not decomposed by light, air, moisture or organisms, therefore, indelible ink.



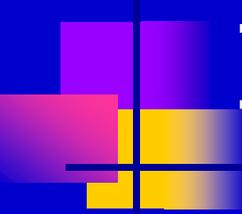
Ink

Iron Gallotannate Ink

Was made from oak nut galls and used in fountain pens.

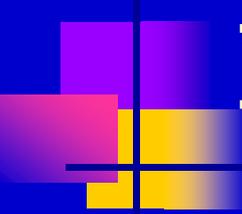
Blue dye added to give immediate color.

When blue dye fades, the iron oxidizes and forms a brownish-red trace.



Ink

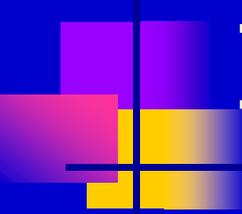
The most popular fountain pen ink:
Aqueous solution of synthetic dyes.
Ball Point Pens use synthetic dyes in
alcohol solvent.
Before 1950 – oils
After 1950 - glycol



Ink

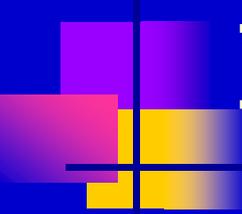
Fiber Tip Pens

Water-based or xylene-based with dyes.
Xylene is used as a solvent.



Ink

- **Xylene** is a colorless mixture of chemically-related hydrocarbons that often finds use as a **solvent** for paints and printing inks. It's very good at dissolving compounds that dissolve poorly in water.



Ink

Gel Pens

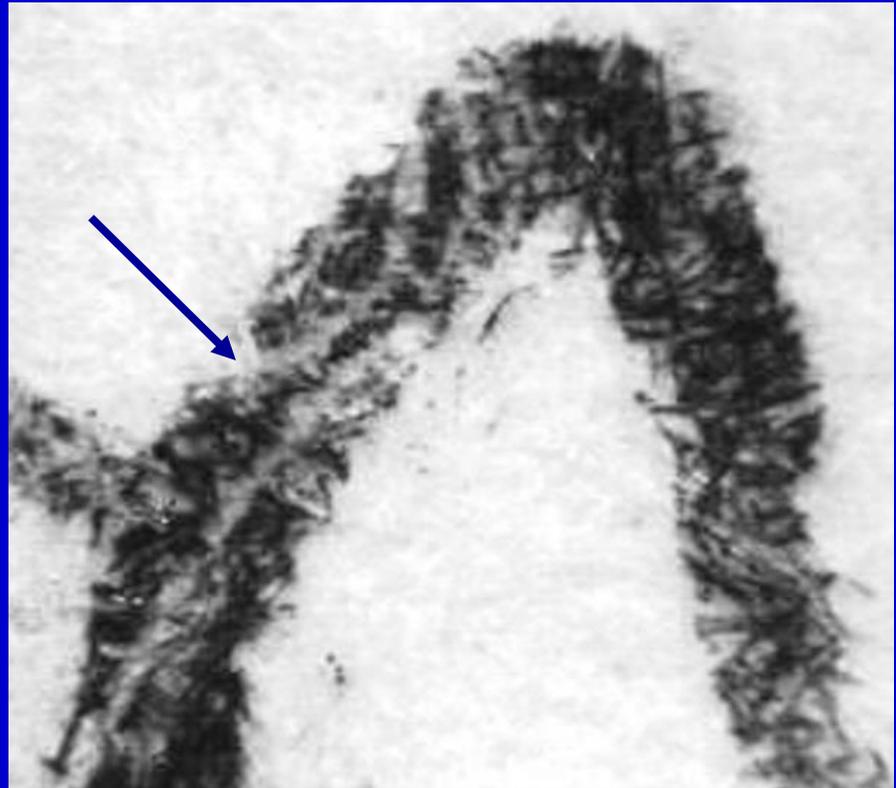
Uses ink in which pigment is suspended in a water-based gel known for its high viscosity.

Viscosity is the state of being thick, sticky, and semifluid in consistency, due to internal friction.

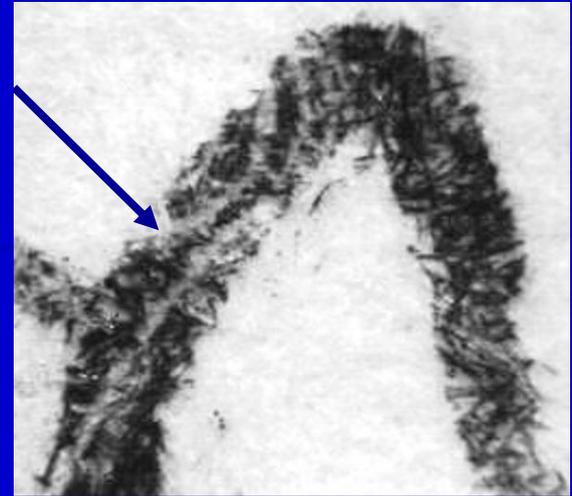
Identifying Ink

Ball point ink:

- Shiny
- Burr-striations.
- None burr-striations.



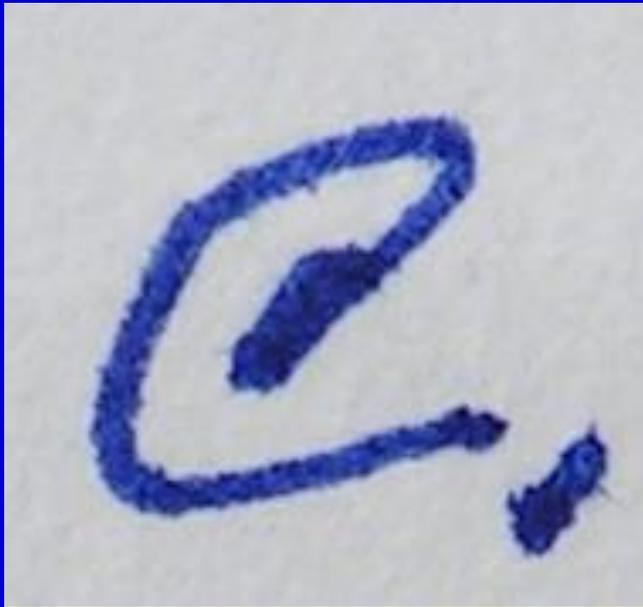
Identifying Ink



- **Non-burr" striation** is a typical gross blank streak caused by failure of ink to fully cover the ball in its rotation in housing.

Identifying Ink

Water Based Inks:



Identifying Ink

Water-based ink:

- Absorbed by paper.
- Spreads evenly.
- Not shiny.
- No striations.



Identifying Ink

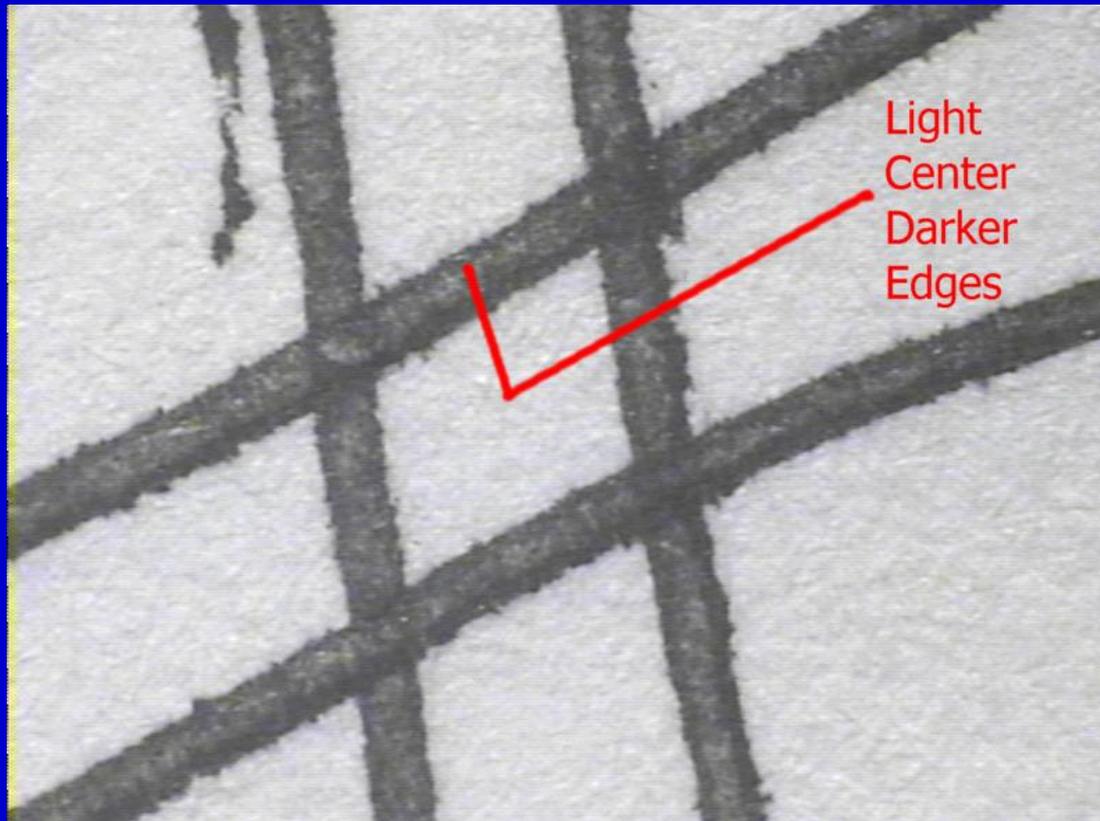
Fountain pen ink:

- Edges darker from the nib.
- Ink is absorbed.
- Possible feathering.



Identifying Ink

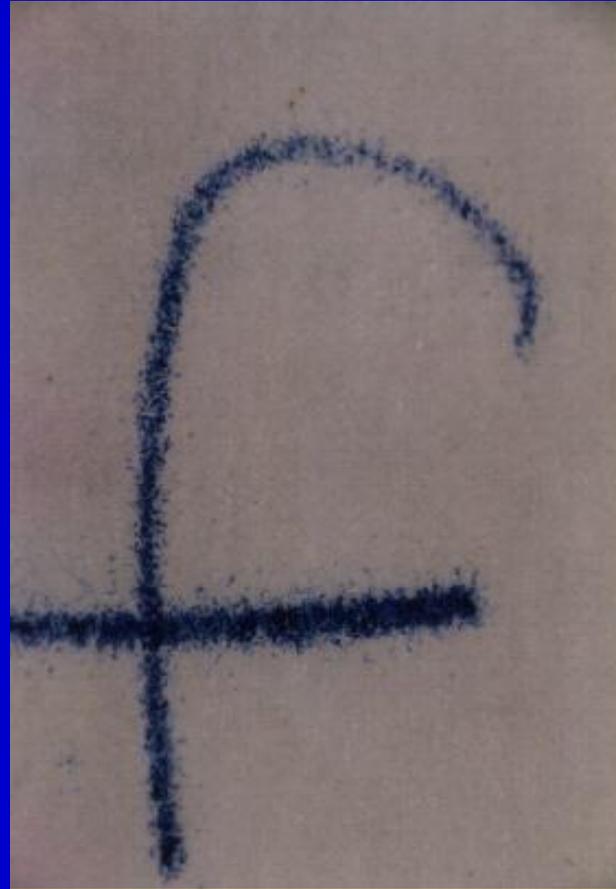
Gel Pens:



Identifying Ink

Carbon Copy:

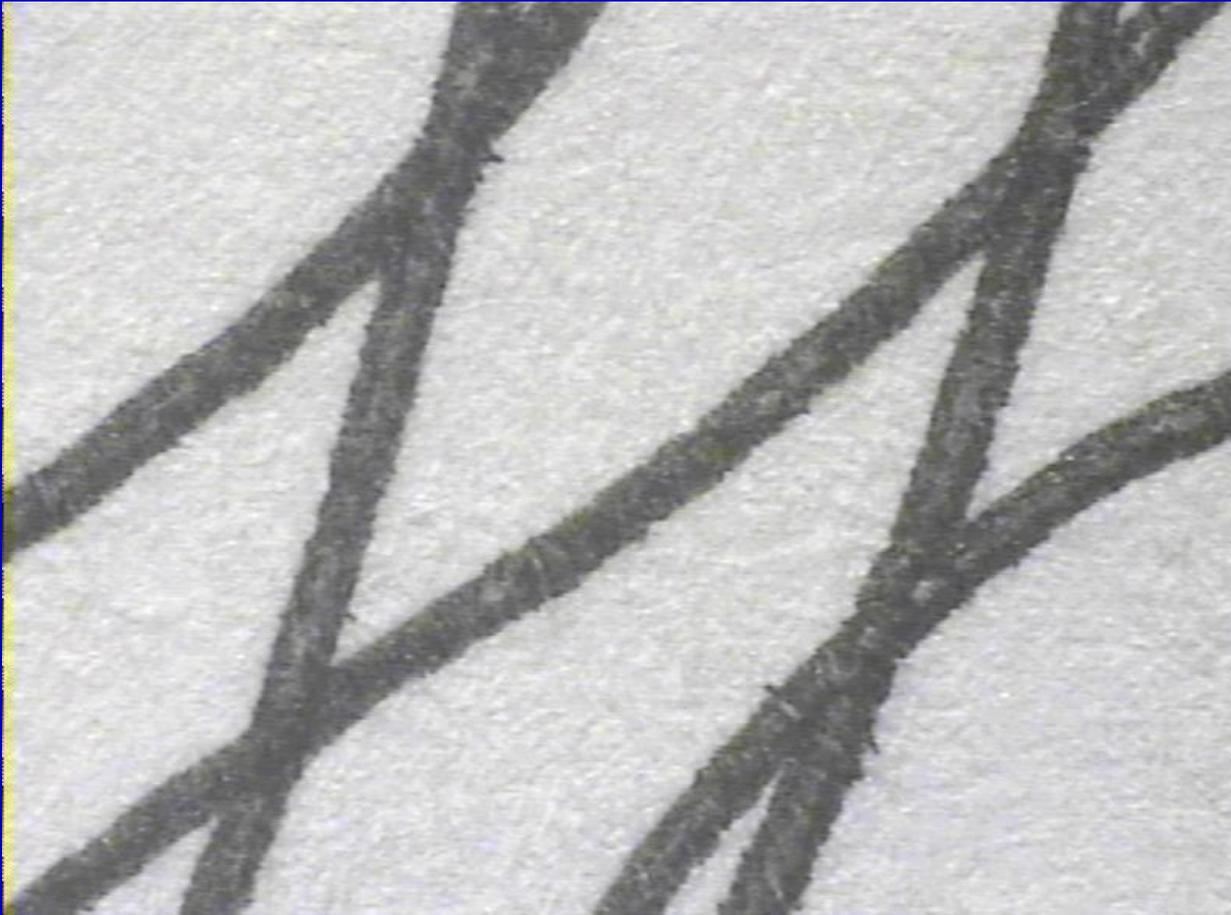
- Blue or black.
- Feathering.

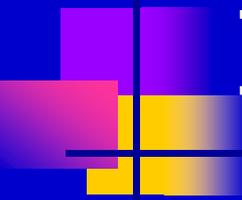


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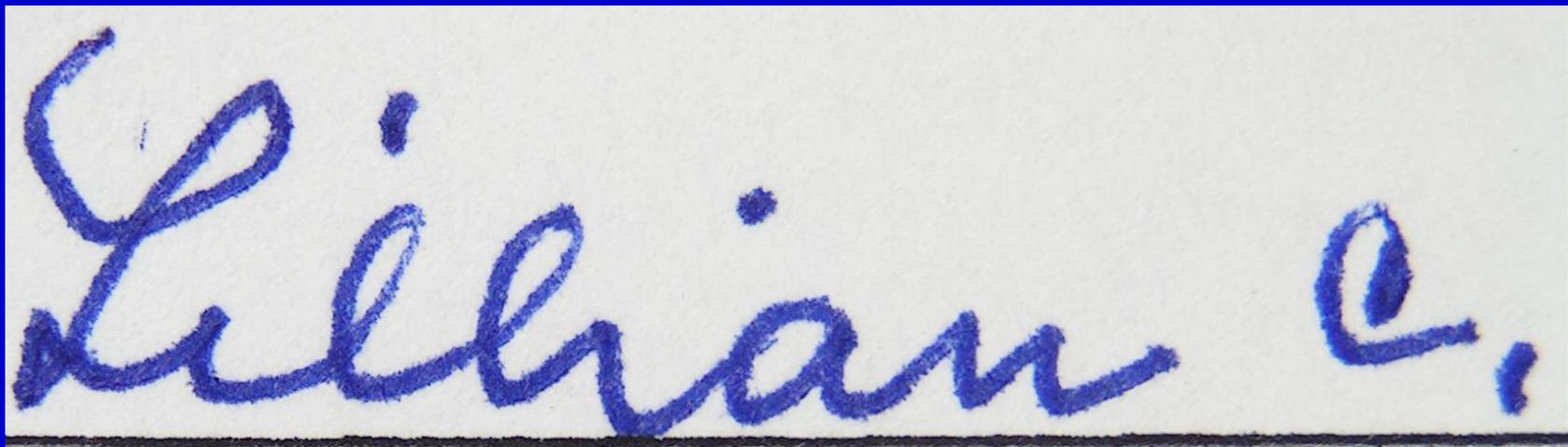


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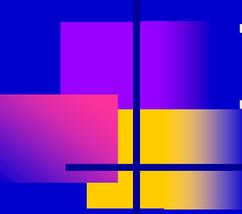




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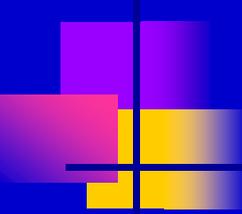


Lillian E.



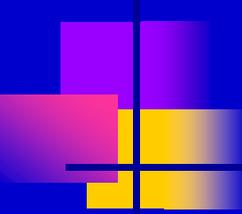
Ink Dating

- Tags of rare earth elements
- Ink Library
- Thin Layer Chromatography (TLC)



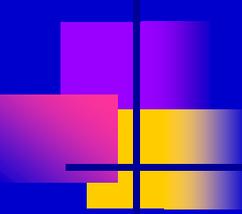
Determining the Age of Ink

- Ink chemists date ink by first taking tiny plugs out of the ink line.
- Ink can be dated based on the time an ink sample is placed on a document up to 2 years.



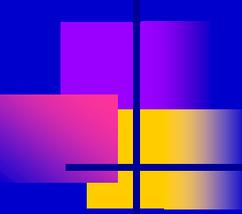
Determining the Age of Ink

- Ink chemists add a solution to the ink plugs that breaks down the components of the ink.



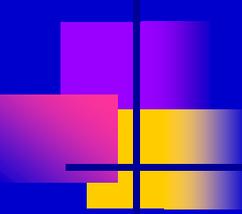
Determining the Age of Ink

- A number of different processes leading to ink degradation begin immediately after its deposition on the paper substrate. These ageing changes include colorants decomposition, evaporation and diffusion of solvents, as well as resins polymerization.



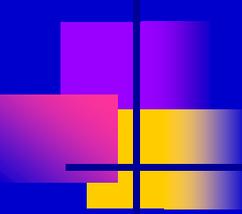
Determining the Age of Ink

- There are several methods of dating ink.
- One of the most accurate is based upon rare chemicals that some ink manufactures have added to ink to give the date that ink was first manufactured.



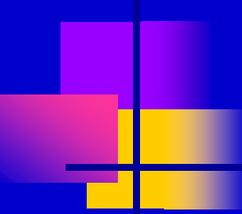
Determining the Age of Ink

- The dating of ink cannot determine the exact date the ink was placed on the paper.
- Each type of ink has different compositions.
- Most ink dating has been done on ballpoint ink.



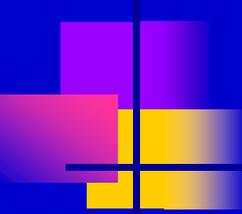
Determining the Age of Ink

- The initial composition of the ink, substrate properties (grammage, thickness and pores sizes, fibers arrangement, coatings) and environmental and storage conditions of a document (temperature, light exposure, humidity, air flow) are just a few examples of other factors that also directly affect the rate at which the ink ages.



Determining the Age of Ink

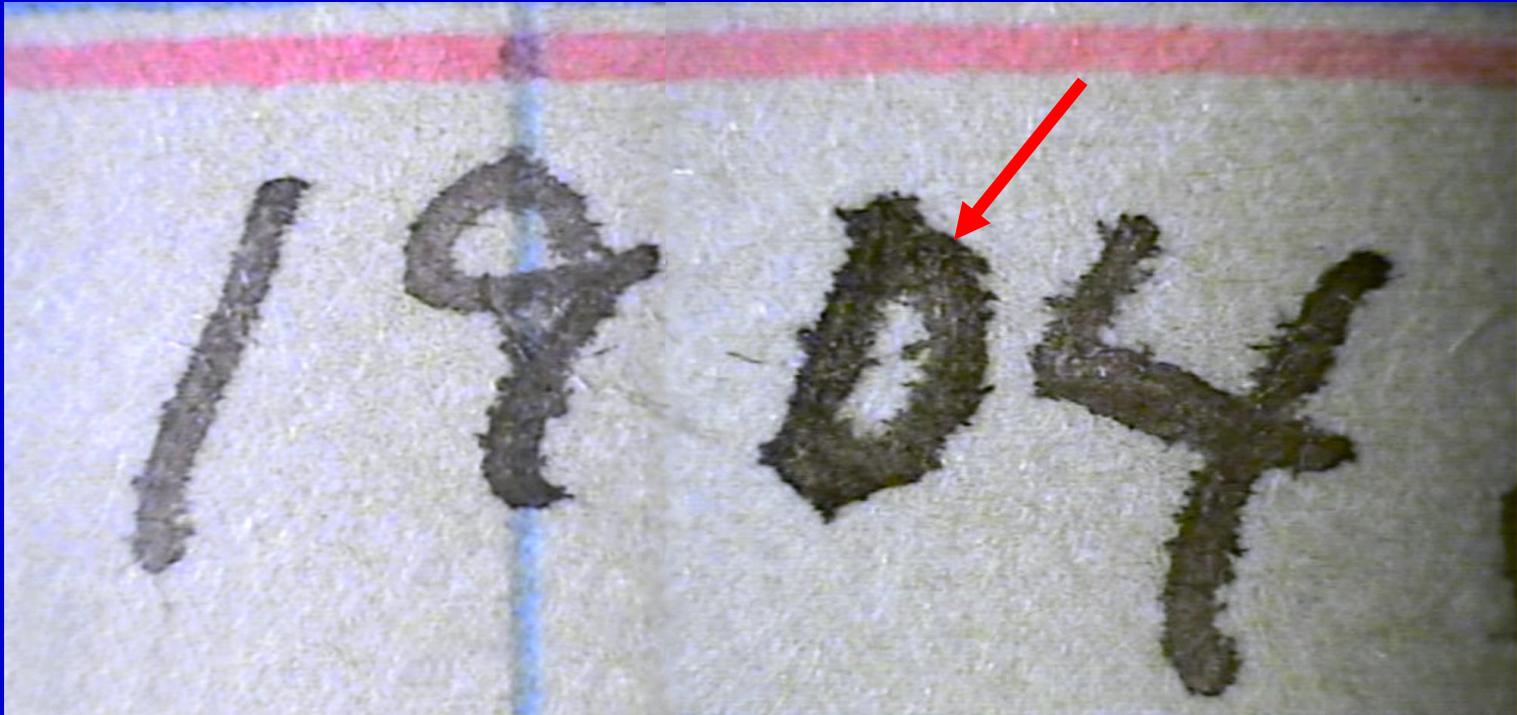
- Some inks fluoresce or emit light on exposure to ultraviolet while others disappear enabling one to see if different inks were used on a document.



Determining the Age of Ink

- The main method of non-destructive ink analysis is micro-spectrophotometry.
- This involves scanning the ink with ultraviolet or infrared light to record its spectrum, that is, the wavelengths of light it absorbs.

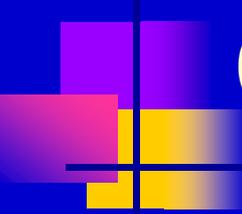
Cases



Cases

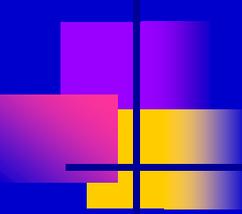
- A different ink was used to change the 1 into a 0.



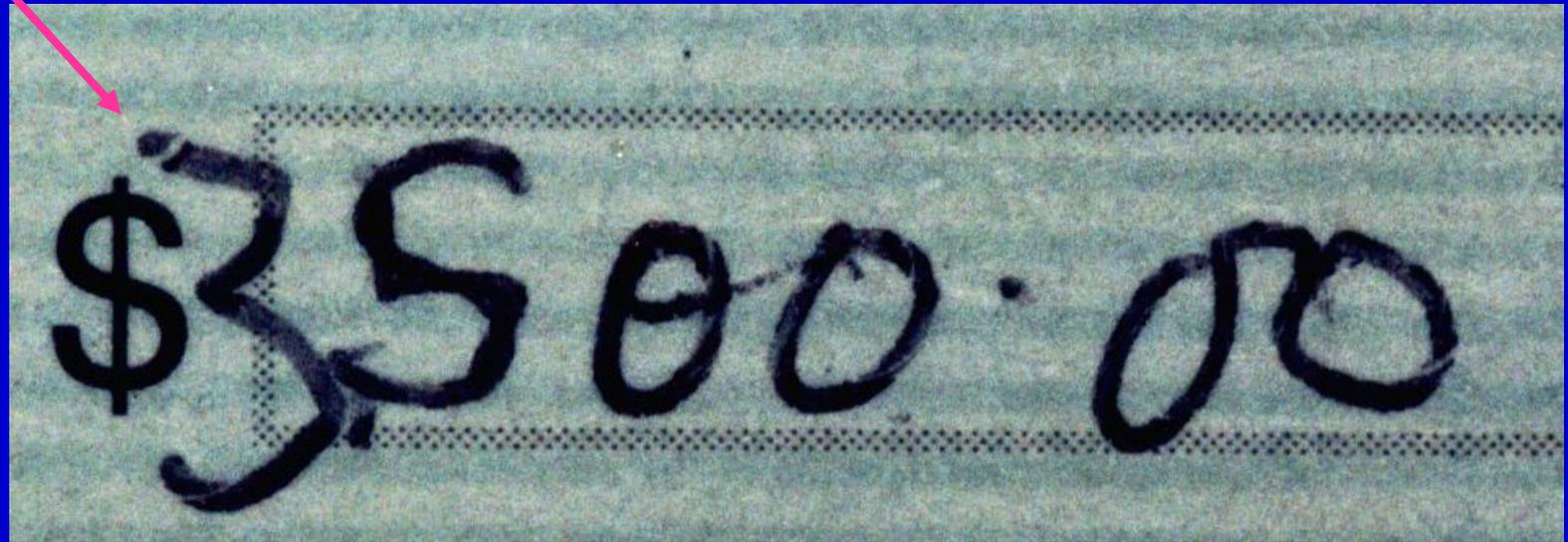


Cases



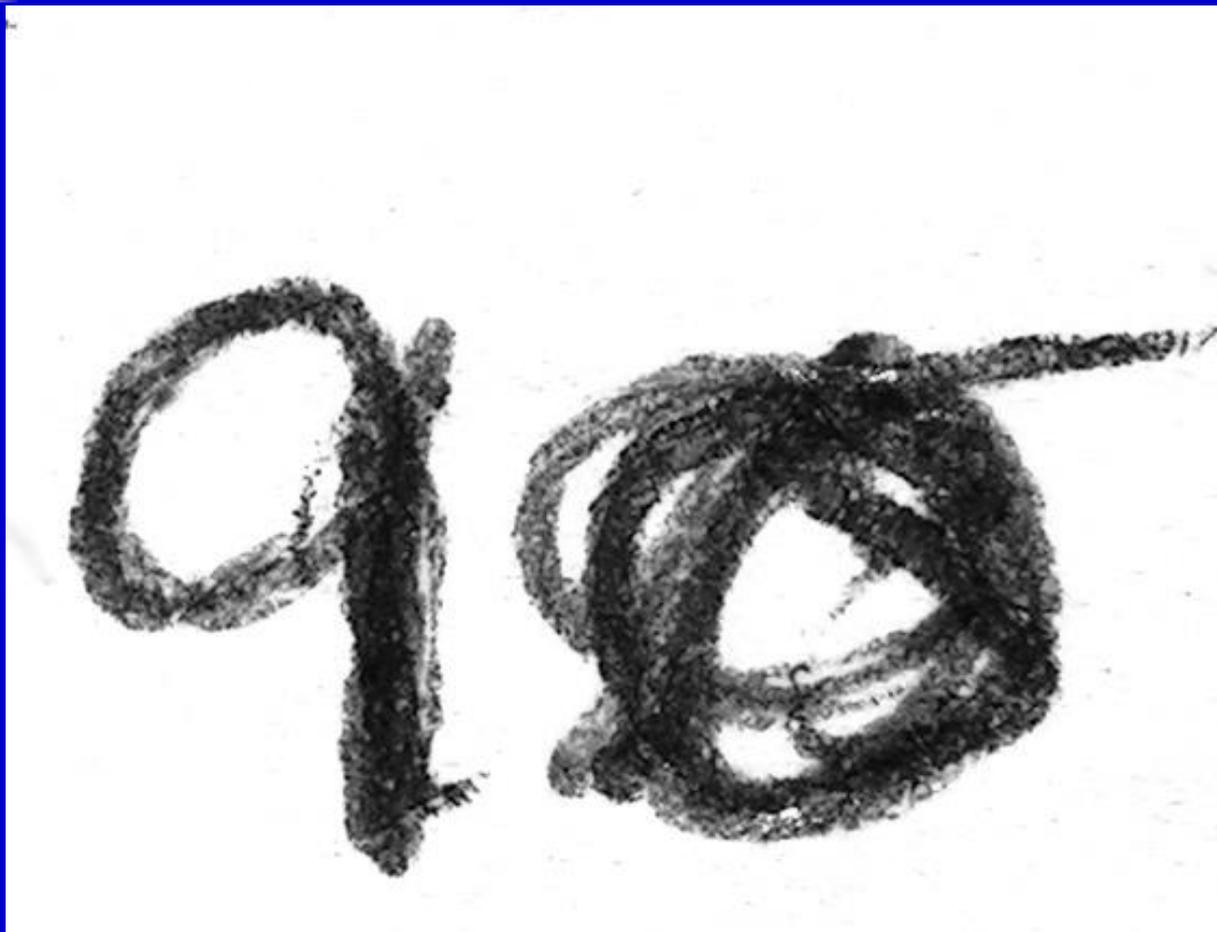


Cases



\$3500.00

Cases



Cases

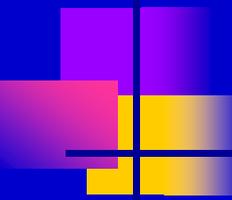


Cases



Cases





Cases

It went
under
equal

Identifying Ink

igned this 16 day of May, 1992,

: 9506 Harbor Road, Baltimore

itness by:

y: Gordon Hill

Gordon Hill, President of Chesapeake Industrial

itness by:

his 16 day of May, 1992,

9506 Harbor Road Baltimore

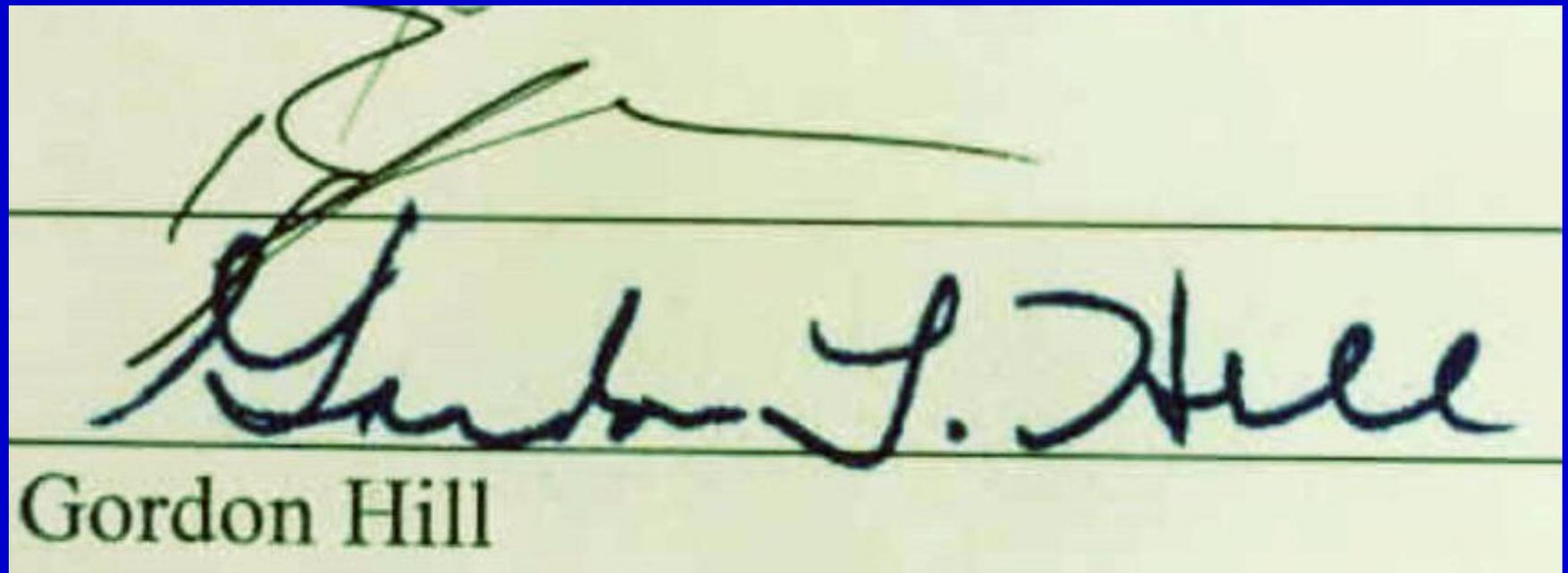
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Gordon Hill

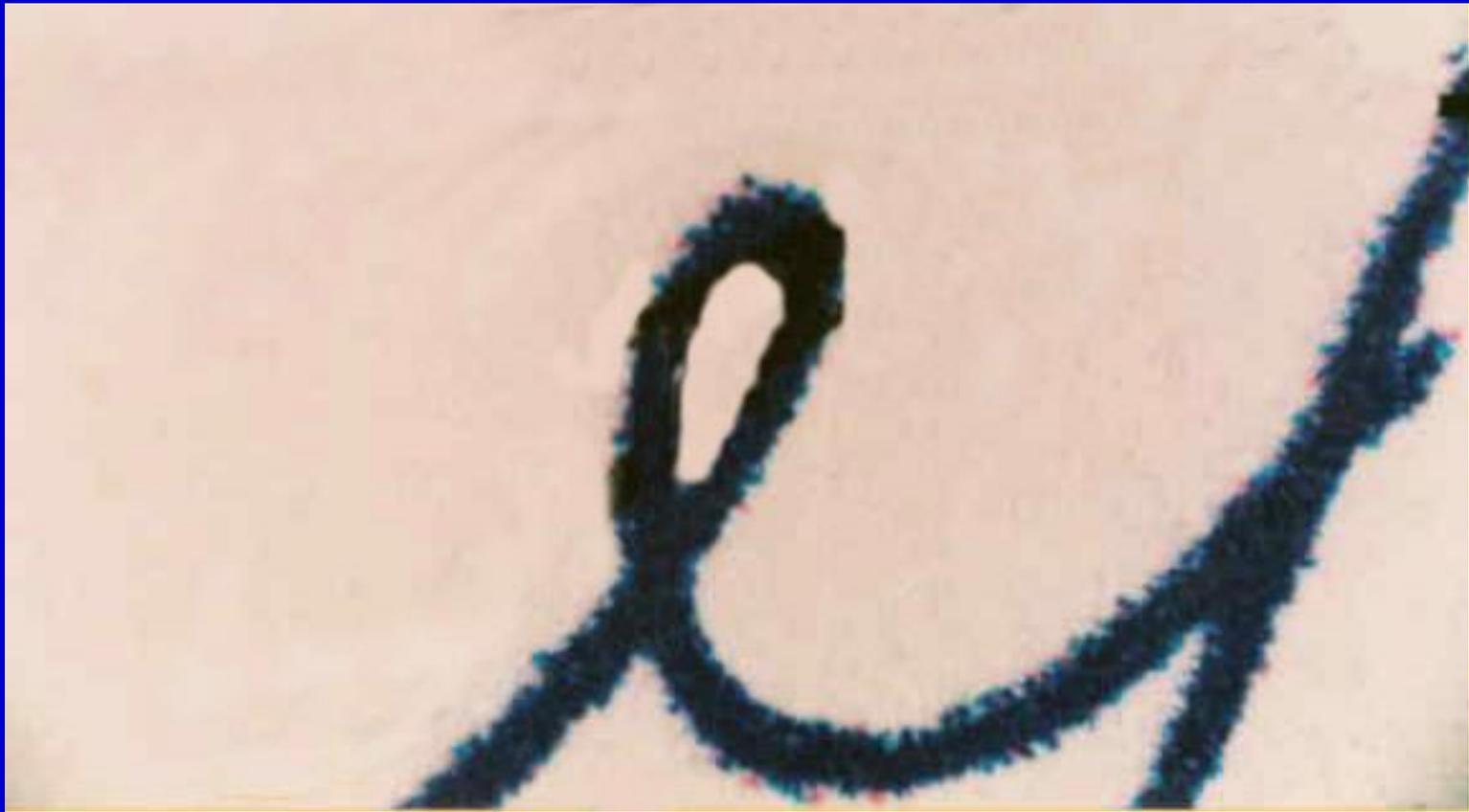
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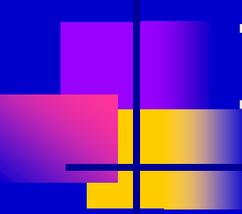
by:

Identifying Ink



Identifying Ink





Ink Experts

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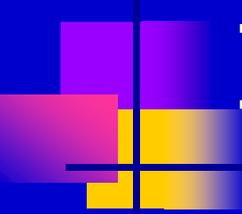
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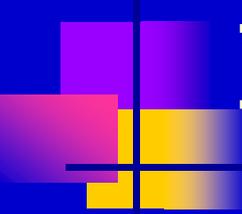
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