

Technical Studies of Watermarks at the Academy of Fine Arts Vienna:

Soft X-ray Radiography of Rembrandt Objects
and Drawings of the 19th cent.

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Aim of the project:

- comparative studies of watermarks
- non-destructive determination of the watermarks with transportable instrumentation
- (digital) catalogue of the watermarks
- dating of art objects

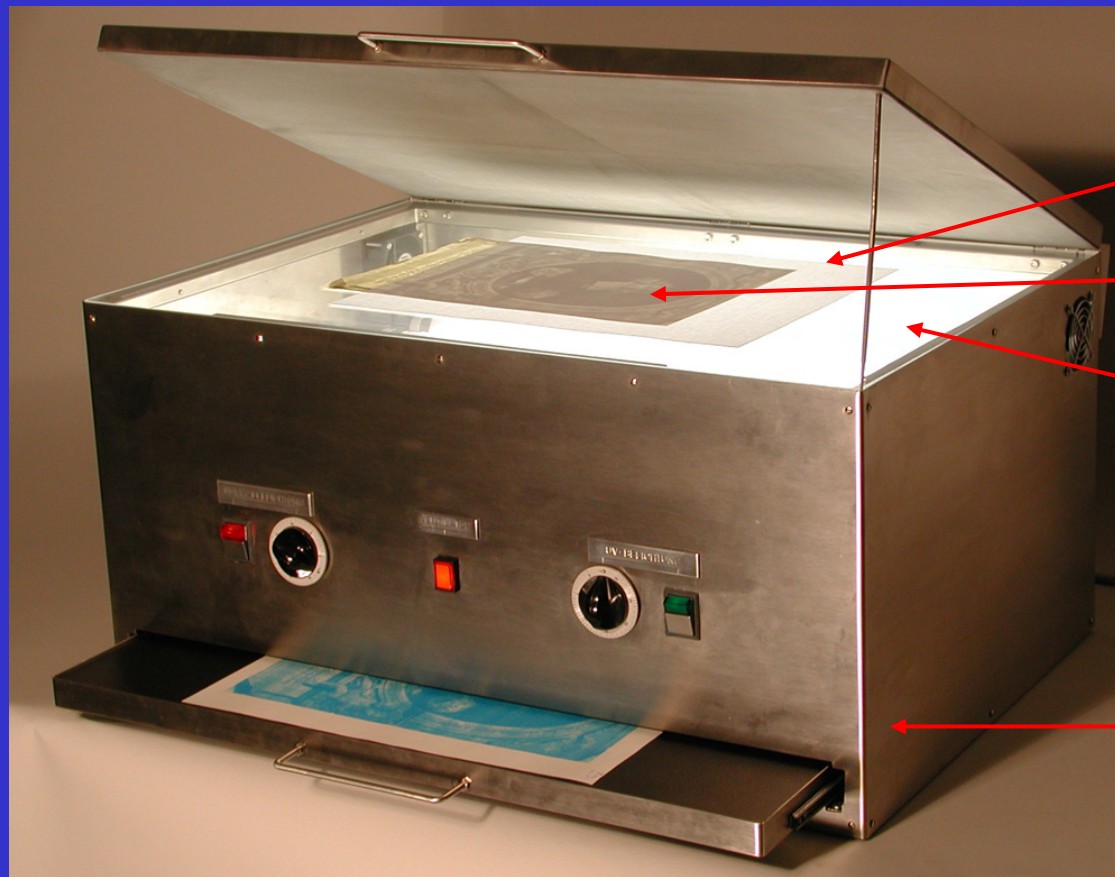
Methods used for the Determination of Watermarks and their Reproduction: IPH Vers.2.0, 1997

- TRAC - Hand-drawn tracing
- PHOT - Transparency photographs
- RUBB - Rubbing
- PHOS - Phosphorescence technique
- SURF - Digital non-contact thickness measuring

Methods used for the Determination of Watermarks and their Reproduction: IPH Vers.2.0, 1997

- **UVPH** - **UV-photography / DYLUX Method**
- **RADI** - **Radiography**
 - SX** - **Soft x-ray radiography**
 - BETA** - **Beta radiography**
 - ELEC** - **Electron radiography**
- **SCAN** - **Scanning**

Dylux-Method



Day light

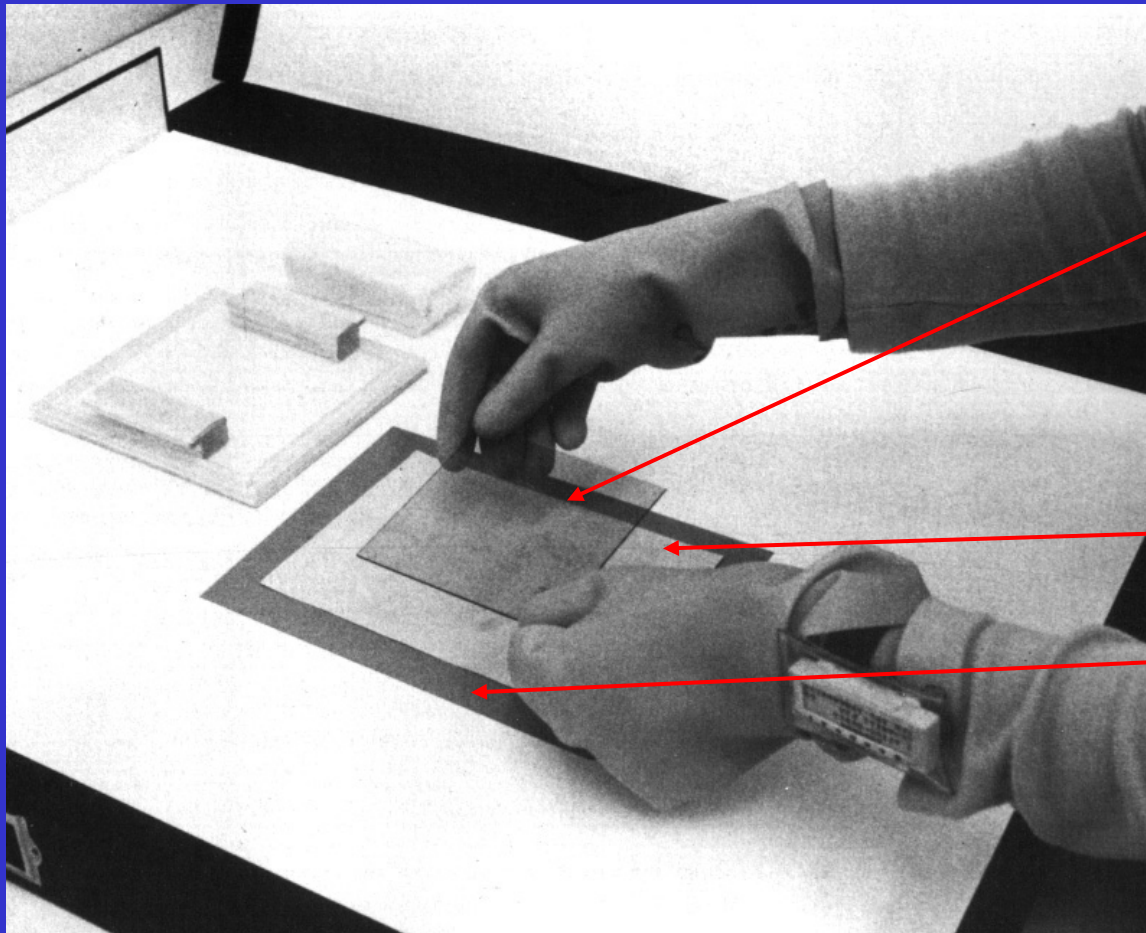
Dylux 503-1B Paper

Object

Visible light:
410-500 nm
exposure time:
1-15 min

UV light:
200-400 nm
exposure time: 1 min

Beta Radiography (Dr. A. Haidinger, ÖAW)



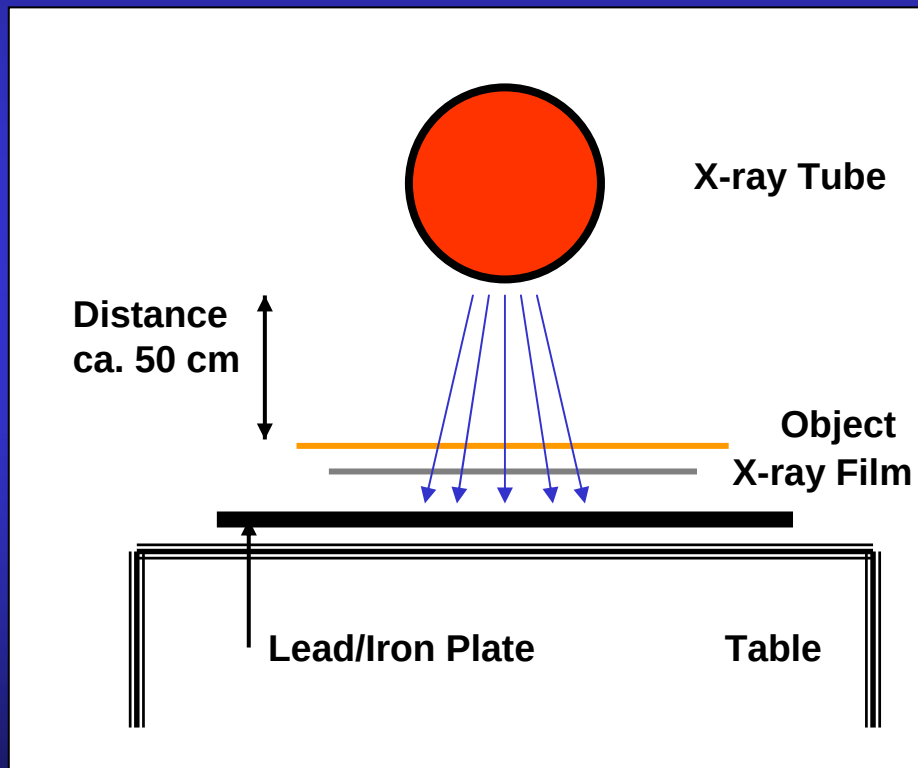
Darkroom: red
safe light

Beta radiography
plate: 150 mCi/g of
radioactive C-14
178 x 128 cm

Object

X-ray film: Kodak
Bio Max MR
18 x 24 cm
exposure time:
4 - 8 h

X-ray Radiography with Soft X-Ray Radiation



X-ray Tube:
Baltospot 100 kV
Fa. Balteau NDT

Exposure:
ca. 8-12 kV
7-15 min

Film:
Agfa Structurix D4
or D2

3 Case Studies

1. Copper engraving “Fides” by
H. Goltzius (1558 - 1617)
2. Copper engraving “Fides” by J.Ch. Weigel (†1746)
after H. Goltzius
3. 2 Woodcuts:
“The Building of the Tower of Babel”
“The Fall of Jericho”,
cuttings from a bible, Germany,
about 16th century



Case Study 1:
Copper engraving „Fides“
by H. Goltzius (1558-1617)

Size: 22.5 x 15.6 cm

Scan Image

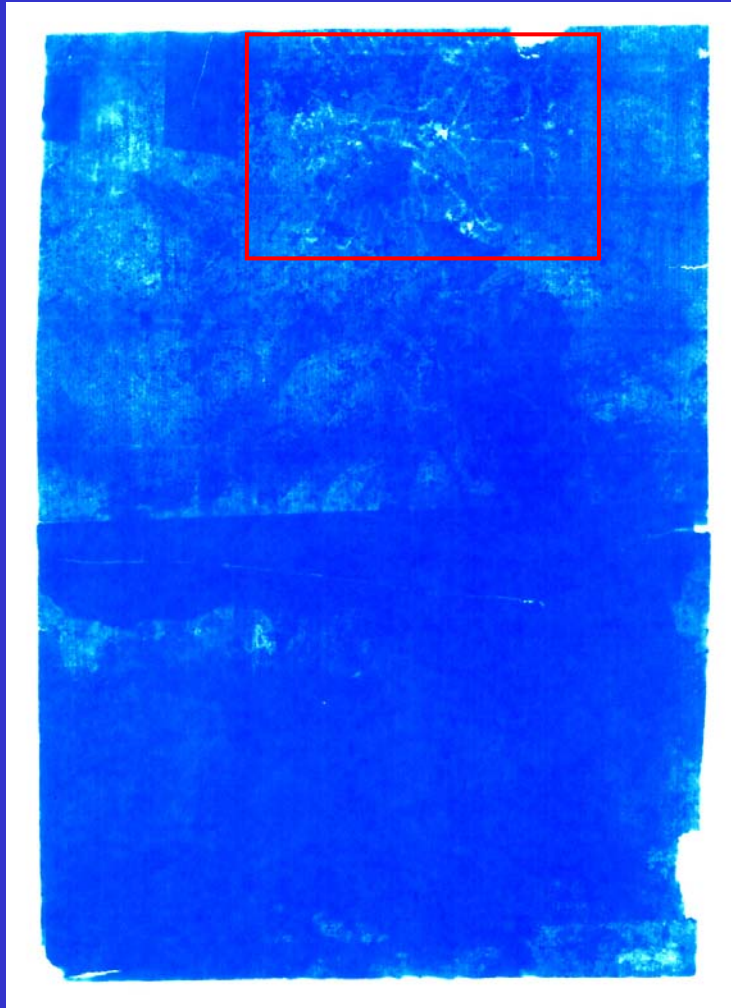


Case Study 1:

Copper engraving „Fides“
by H. Goltzius (1558-1617)

Watermark: hardly visible
(printing ink, heavy adhesive,
and thick layered papers are also
visible)

Transmission Scan

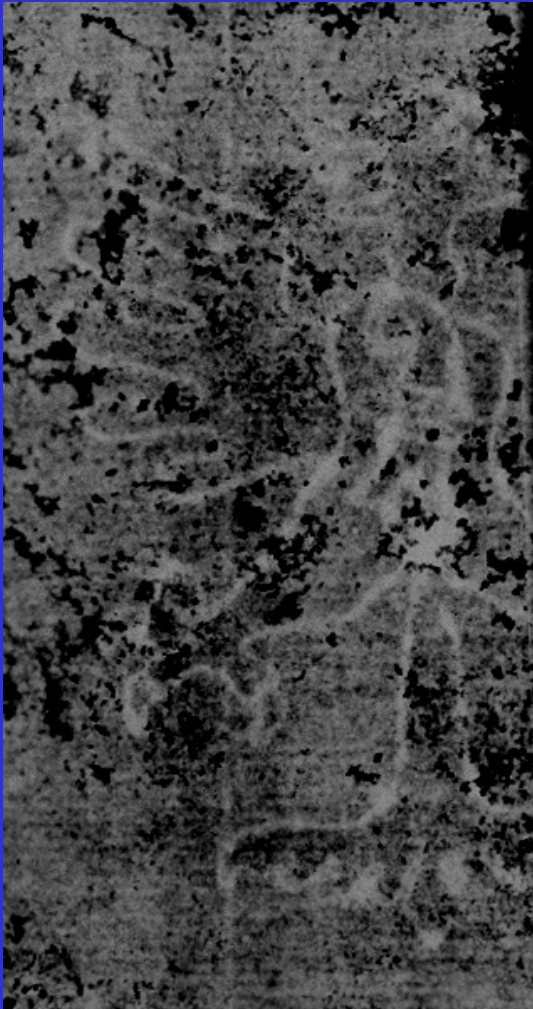


Case Study 1:

Copper engraving „Fides“
by H. Goltzius (1558-1617)

Watermark: hardly visible
(single headed eagle with Basel
crozier on chest)

DYLUX Method

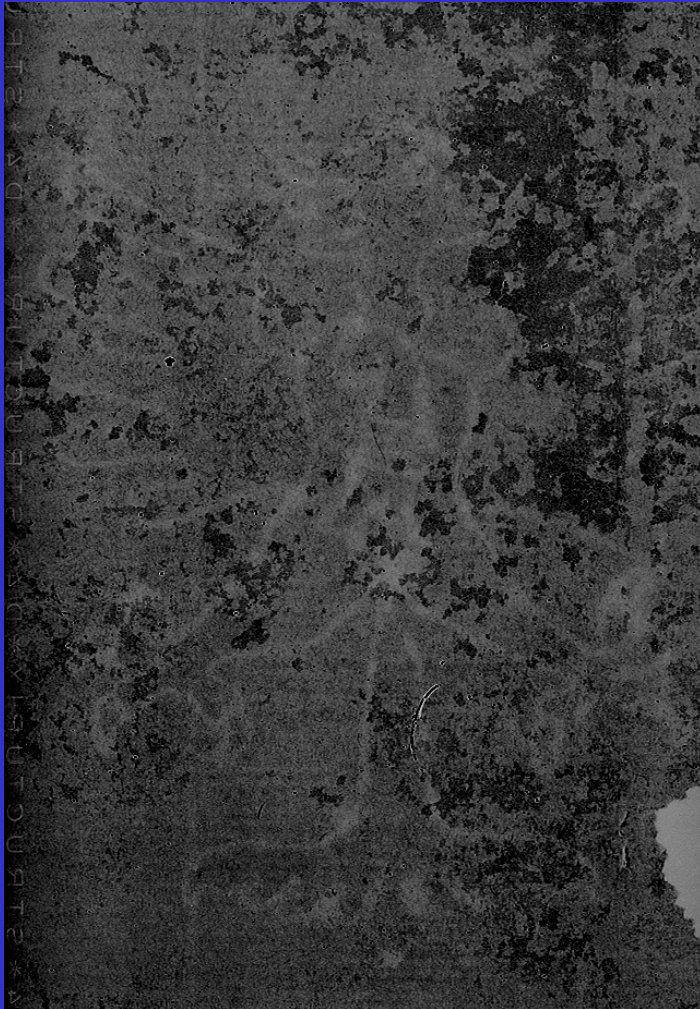


Case Study 1:

Copper engraving „Fides“
by H. Goltzius (1558-1617)

Watermark: good visible
(heavy adhesive and thick
layered papers block the e-rays)

Beta-Radiograph



Case Study 1:

Copper engraving „Fides“
by H. Goltzius (1558-1617)

Watermark: visible

(image has more details than
that obtained by β -radiography
since the radiation source is
sharply focussed)

X-ray Radiograph



Case Study 2:
Copper engraving "Fides"
by J. Ch. Weigel (†1746)
after H. Goltzius

Size: 21.8 x 14.2 cm

Scan Image

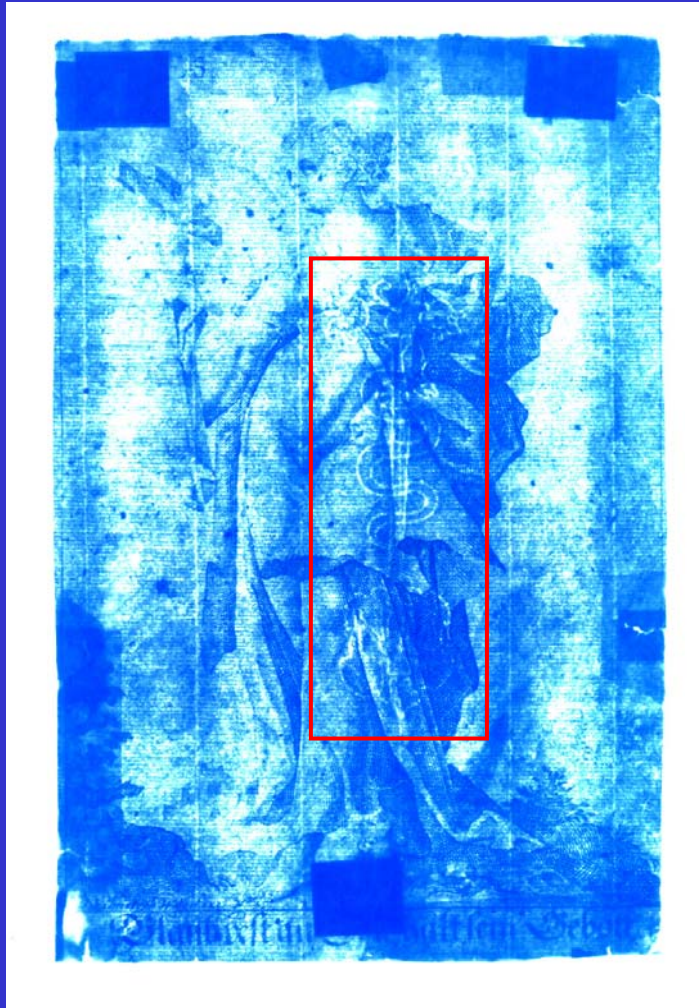


Case Study 2:

Copper engraving "Fides"
by J. Ch. Weigel (†1746)
after H. Goltzius

Watermark: hardly visible
(printing ink is also visible)

Transmission Scan

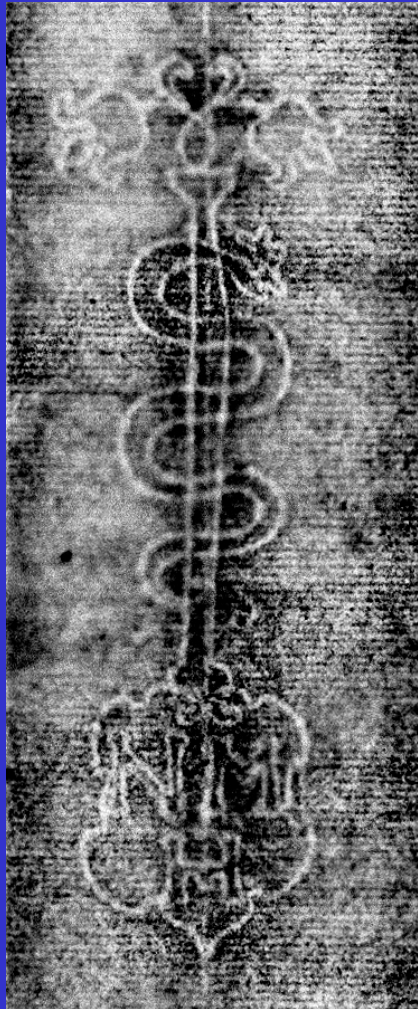


Case Study 2:

Copper engraving “Fides”
by J. Ch. Weigel (†1746)
after H. Goltzius

Watermark: hardly visible
(snake on a shaft/column with
the monogram NHM in the coat
of the arms)

DYLUX Method



Case Study 2:

Copper engraving “Fides”
by J. Ch. Weigel (†1746)
after H. Goltzius

Watermark: visible

(partly diffuse image due to the
poor contact of the film to the
object)

Beta-Radiograph



Case Study 2:

Copper engraving “Fides”
by J. Ch. Weigel (†1746)
after H. Goltzius

Watermark: clearly visible
(design in carbon ink and most
other printing media do not
absorb soft x-ray radiation)

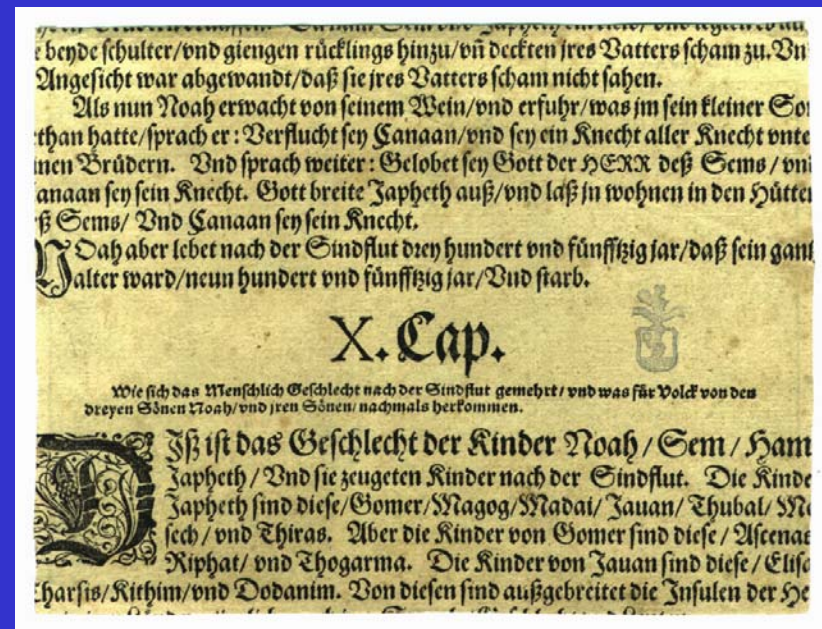
X-ray Radiograph

Case Study 3a:

Woodcut „The Building of the Tower of Babel“
a cutting from a bible, German, about 16th century



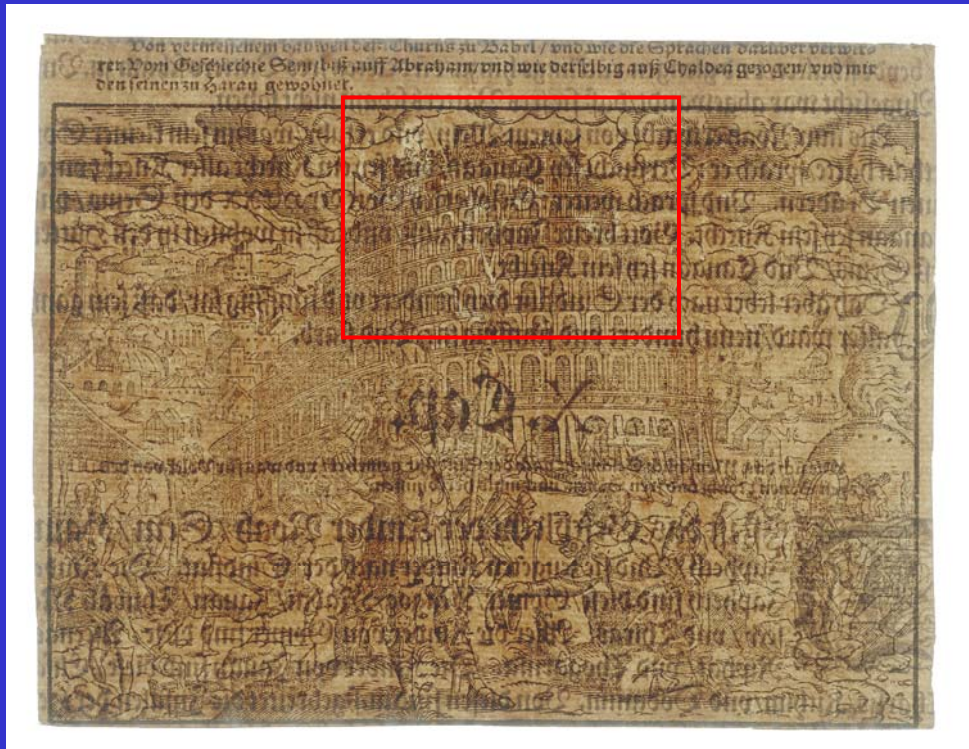
Scan Image



Size: 12.2 x 16 cm

Case Study 3a:

Woodcut „The Building of the Tower of Babel“
a cutting from a bible, German, about 16th century

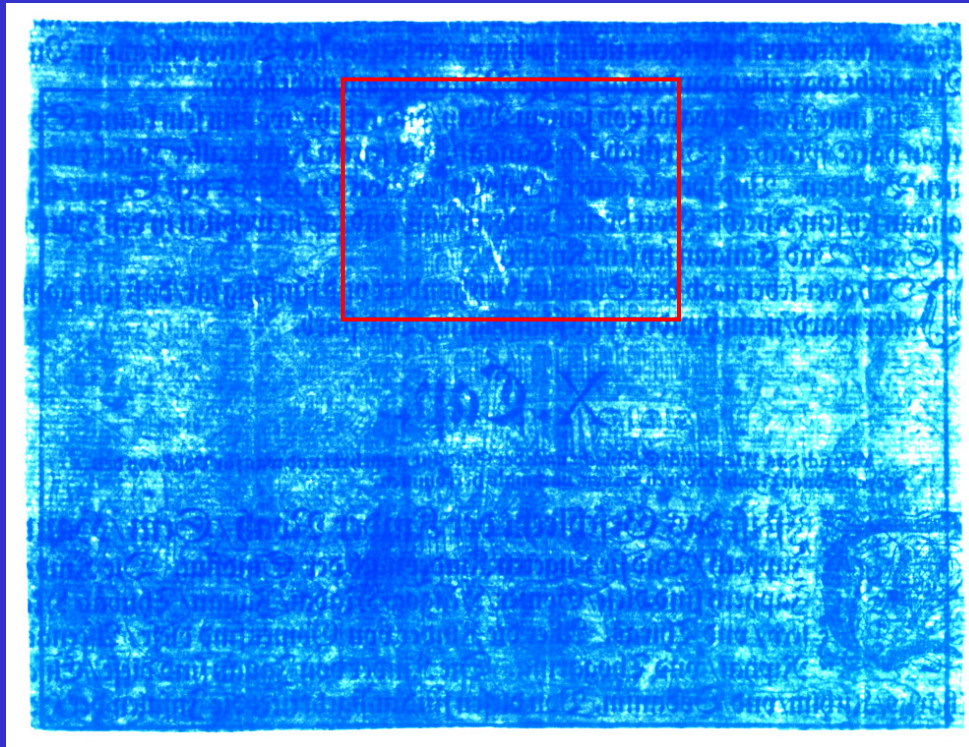


Watermark:
very hardly visible
(text and image are also visible)

Transmission Scan

Case Study 3a:

Woodcut „The Building of the Tower of Babel“
a cutting from a bible, German, about 16th century

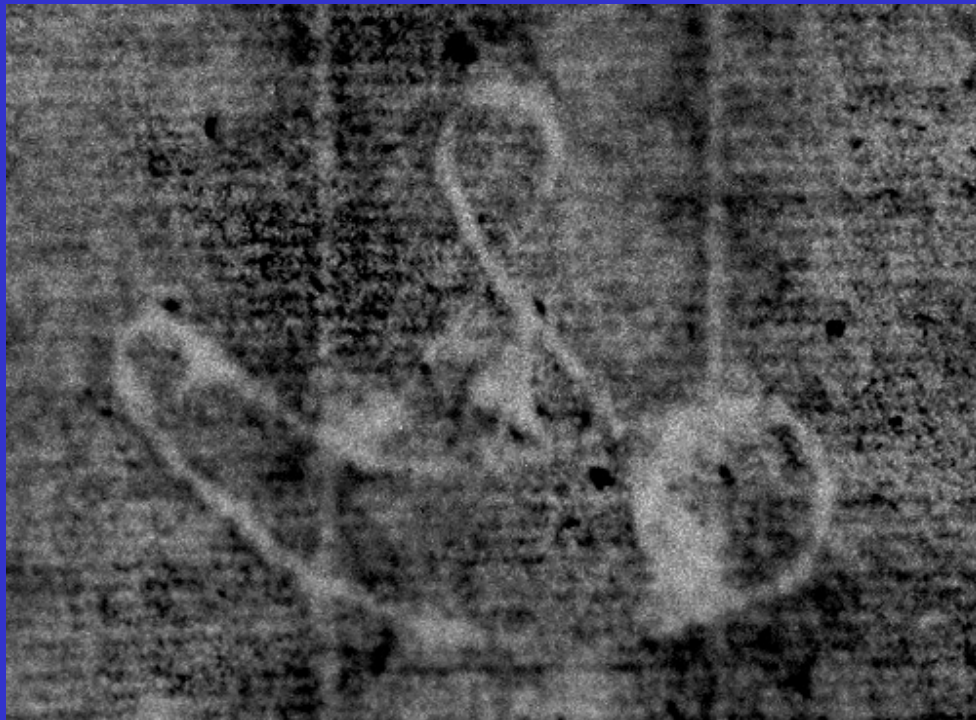


Watermark:
hardly visible
(horn with baldric, flat
opening)

DYLUX Method

Case Study 3a:

Woodcut „The Building of the Tower of Babel“
a cutting from a bible, German, about 16th century

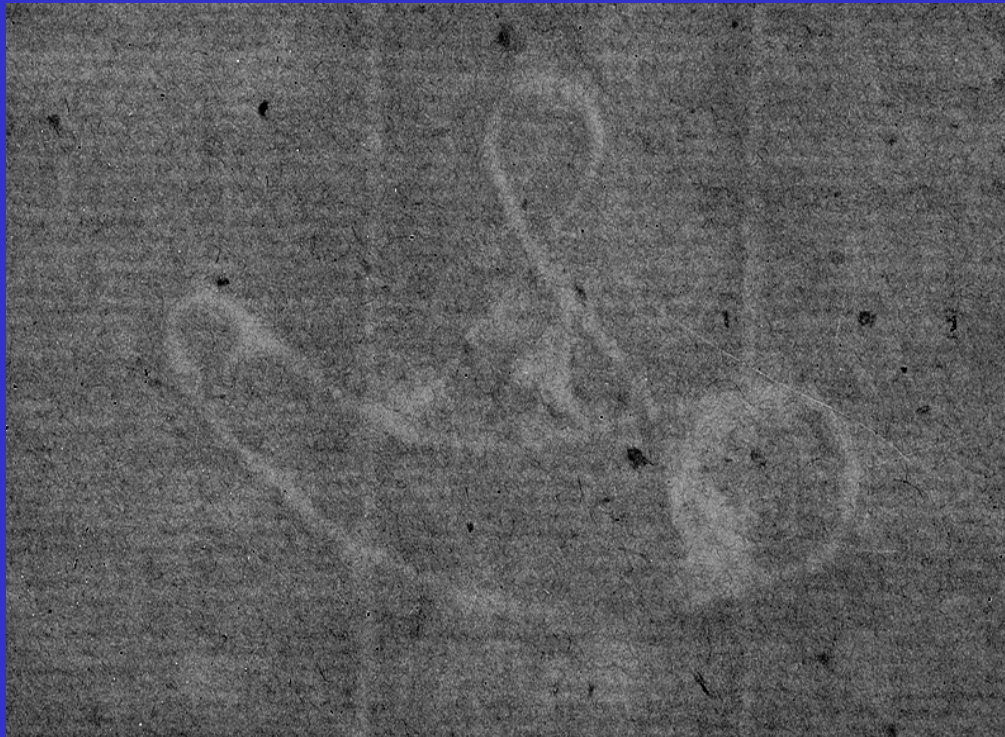


Watermark:
clearly visible
(horn with baldric, flat
opening)

Beta Radiograph

Case Study 3a:

Woodcut „The Building of the Tower of Babel“
a cutting from a bible, German, about 16th century



Watermark:
clearly visible
(horn with baldric, flat
opening)

X-ray Radiograph

Case Study 3b:

Woodcut „The Fall of Jericho“
a cutting from a bible, German, about 16th century



trundschafft das Land. Vnd da sie hinauff gegangen waren / vnd Ai verkünd
t hatten / kamen sie wider zu Josua / vñ sprachen zu im : Laß nicht das ganze vol
nauff ziehen / Sondern bey zwey oder drey tausend Mann / daß sie hinauff ziehet
id schlagen Ai / daß nicht das ganz volck sich daselbs bemühe / denn jr ist wenig.

Also zogen hinauff des Volcks bey drey tausend Mann / Vnd die flohen für de
rännern zu Ai / vnd die von Ai schlugen jr bey sechs vnd dreyßig Mann / vnd sagte
e für dem Thor bis gen Sabarim / vnd schlugen sie den weg herab. Da ward den
volck das hertz verzagt / vnd ward zu wasser.

Josua aber zerreiße seine Kleider / vñ fiel auff sein angesicht zur Erden für der L
den des HERREN / bis auff den abend / sampt den Eltesten Israel / vnd worffe
staub auff ire häupter. Vñ Josua sprach : Ach HERRE HERRE / Warumb hast
du volck vber den Jordan geführt / daß du vns in die hände der Amoriter gebest vñ
abzubringen : O daß wir weren jenseit des Jordans blieben / wie wir angefang
atten. Ach mein HERRE / Was sol ich sagen / weil Israel seinen Feinden den rücke
hret : Wenn das die Gananiter vnd alle Einwohner des Landes hören / so werde
e vns umgeben / vnd auch vnsern Namen aufrotten von der Erden. Was wilt
enn bey deinem grossen Namen thun?

Da sprach der HERRE zu Josua : Stehe auff / warumb ligstu also auff deinem ar
gesichte Israel hat sich versündigt / vñ haben meinen Bund vbergangen / den ich ine
botten habe / dazu haben sie des Verbannten genommen / vnd aetholen / vnd verlor

Scan Image

Size: 11.6 x 15.8 cm