How widespread are forgeries?

- Thomas Hoving (former director of MMA, New York) in *False Impressions* (1996)
  - I was with the Metropolitan Museum of Art for 15 years
  - I examined some 50,000 works in all fields
  - At least 40% were either
    - Phonies
    - Cynically restored, or
    - Wildly misattributed—as bad as forgeries
  - Since then, I’m sure the percentage has risen.

How is a work of art authenticated?

- It is a combination of
  - Provenance
  - Connoisseurship
  - Scientific verification

- The Three Pillars of Authentication

Provenance of a Work

- A list of the previous owners
  - Tracking the work back in time
  - From its present location and owner
  - To the hand of the artist

- The provenance should begin with
  - The sale by the creator or...
  - The documented excavation

- The provenance should end with the present owner

Example of a Provenance—*La Vie, Pablo Picasso*

- Description:
  - Medium: oil on canvas
  - Measurements
    - Framed
      - 239cm x 170cm x 10 cm
    - Unframed
      - 196.5cm x 129.2cm
  - Date: 1903

The Provenance

- 1903—Sold by the artist to M. Jean Saint-Gaudens, Paris
- 1927—Acquired by the dealer J.K. Thannhauser, Berlin
- 1930—Acquired by the dealer Etienne Bignou, Paris
- 1937—Bought by the Rhode Island School of Design, Providence
- 1945—Acquired by the dealer J. Seligmann, New York
- 1945—Acquired by the Cleveland Museum of Art (Hanna Fund)
- Present—Owned by the Cleveland Museum of Art

A clear, unbroken chain of ownership from creation to the present day
Connoisseurship

• Definition
  An expert's opinion that a given work is
  – A valid example of the artist's work or
  – A valid example of the archaeological period

How to Become a Connoisseur

• There are...
  – Some degree programs
    (Christie's in New York)
• But the most important thing is…
  – Spend your life studying and evaluating art works

Faulty Connoisseurship

• Can arise from overconfidence, misplaced zeal, greed, outright corruption

A Recent Case of Connoisseurship in Doubt
"Salisbury Cathedral from the Meadows" John Constable (1831)

A Constable(?)

• Lady Hambleden
  – Downsize from a manor
  – To a cottage
• Auctioned off the painting
  – Listed by Christie's as the work of a Constable follower
  – Listed value, $1200, sold for $5200
  – To an anonymous buyer, an art dealer

A Hunch(?)

• The dealer had it cleaned
  – Took it to a Constable expert, Anne Lyles
• She deemed it a true Constable
• Offered at Sotheby's (New York)
  – Valued at $3 million
  – Sold for $5.2 million
• Christie's response: a Constable expert
  – “I could see no sign of Constable’s hand in the work,” said Conal Shields, an art historian and Constable scholar

Dueling Connoisseurs

• Sotheby's vs Christie's
• Expert vs Expert
  – Anne Lyles: "… There is something about the application of the paint, the texture in the sky, and the expression of the light and shade—all look correct."
  – Conal Shields: “I see no sign of Constable’s hand in the work”
• And there it rests

Scientific Verification

• Divides into two parts
  – Dating of works
    • Can science find the date of the work's creation?
    • Is this date compatible with the supposed origin?
  – Identification of materials
    • Are materials authentic and "correct"?
    • Did the materials exist at the time the work was made?
Dating
• Wood
  – Harvest date by dendrochronology (tree-ring counting) or C-14 dating
• Fabric, bone, and other once-living material
  – Date of death by C-14 dating
• Ceramics
  – Date of firing by thermoluminescence (TL).
• Marble, granite, other minerals
  – Date of quarrying or manufacture cannot be determined
  – Location of the quarry can sometimes be determined
• Metals
  – Date of smelting (sometimes)

Materials—Paints
• Paint pigments
  – Identification by lab methods (IR, UV, microscopy, XRF)
  – Chronology of introduction—well established
• Dates of pigments
  – Must agree with the date of the painting
    • A 16th century work should not contain zinc white
    • Why? Zinc white was introduced only after 1830
      – Forgers know this

Materials—Marble
• Marble
  – Marble is stable over time
  – Therefore, its date cannot be established
• Stable isotope analysis (SIA) is now used to...
  – Identify the quarry
• If a forger uses the correct marble
  – The work cannot be excluded on the basis of materials
• Here, provenance and connoisseurship are essential

Materials—Metals
• Metals
  – Dates of mining—difficult to determine
  – But, modern metals are purer than older metals
  – Thus, the impurities may date the work

What we’re going to look at...First
• The major methods of dating and analysis
  – Dendrochronology
  – Carbon-14
  – Thermoluminescence
  – Paints and pigments
  – Marble and limestone
  – Metals
• An example of a forgery(?) by each method
Second—Some major forgery events
  – The Met’s terra cotta Etruscan warriors
  – The world’s most successful forger (Vermeers)
  – The “Curious Spurious Kouros” at the Getty
  – The Shroud of Turin
  – The Knoedler Scandal

Dendrochronology—(dendron, Gr. tree + chronology) Finding dates by counting tree rings
  • Measurement of time
    – From the present backwards
    – By recognizing patterns in tree rings
  • Note the difference in spacing

An Early Use of Dendrochronology
  • The Ohio Indian Mounds
    – Part of a group of mounds near Marietta, Ohio
  • Their origin was mysterious
    – Benjamin Franklin said—built by de Soto on his wanderings
    – Thomas Jefferson had excavated one—a burial site
  • Could they be dated?

Yankee Ingenuity
  • Manasseh Cutler took an interest
    – A New England clergyman—A founder of Ohio University
  • In 1788, he examined a tree stump found on top of one mound in 1788
    – It had 463 rings
    – The mound must have been built before 1788-463 = 1325 (superposition)
  • The mound must be pre-Columbian

Origin of Modern Dendrochronology
  • Developed in the early 1900’s by A.E. Douglass
    – Astronomer at the University of Arizona
    – Investigating sun-spot activity and weather
    – He reasoned as follows:
      Sun-spot activity influences weather
      Weather influences tree growth
      Tree growth reflected in tree ring size
  • Conclusion:
    – Tree ring spacing will vary with weather
    – The pattern should be unique for any period
    – Dating of wooden objects seems possible

In 1929, Douglass published his findings
  – Using “dendrochronology”
  – Dated the Anasazi ruins in Arizona
  – This settlement was built ca 1250 CE

The Chronology
  • Trees add new tissue
    – By forming a growth ring at the outer (cambium) layer
    – The thickness of the layer reflects climate
      • Temperature, acidity, and sunlight
      • But principally rainfall
    – Good rainfall years = wide rings
    – Poor rainfall years = narrow rings
Tree ring Growth Compared to Rainfall—Arizona and New Mexico, 20th Century

- The rainfall in temperate zones varies from year to year
- Thus, the pattern of rings that forms is unique over decades

The Regional Chronology

- Rainfall amounts differ from place to place
  - Trends are similar over large regions
  - England is wetter than Italy
    - But rainfall amounts are reflected proportionally in both locations
  - Conclusion: Tree ring patterns are similar over large areas
- Combining two ideas
  - The unique decades-long rainfall pattern and
  - Large regional similarities
- We have the concept of the Regional Chronology

Cross Dating

- Tree-ring patterns from trees of overlapping lifetimes are compared
- Result: A regional chronology going back thousands of years
- This process is called cross-dating

Cross Dating Protocol

- An example of construction of a 100-year chronology
- Three samples are taken
  - A living tree, a dead tree, a structural ruin
- Recognizable common patterns are identified
- The common patterns are placed in adjacent positions
- The dates from present time backwards can be counted
- The date of the early ruin can be determined

The Oldest Trees

- The oldest living trees
  - Bristlecone pines of California and Nevada
  - The oldest—ca 4850 years old
  - The oldest California giant sequoias—ca 3640 years old
- Old trees are helpful but not necessary
  - Cross dating does not require samples of living wood

Measuring tree-ring intervals on a moveable stage microscope

Plotting the tree ring intervals

Construction of a 1900-year chronology

The Death of a Tree—Terminus post Quem

- When a tree is harvested
  - Tree ring accumulation ceases
- Comparing the tree rings to regional chronology gives...
  - The date of harvest
- An object dated in this way...
  - Must have been made after the date of harvest
- This is the Terminus post Quem
  - The “limit after which” or
  - The earliest date on which the object can have been made
Dating a Wooden Object

- The **terminus post quem**
  - Is the date of harvest of the tree, and
  - Is the earliest date on which the article can have been made
- But, a tree may be stored after harvest
  - And then be fashioned into an object
  - Therefore, the object could have been made any time after the harvest date
  - But not before

An Application of Dendrochronology—The Stradivarius “Messiah”

**Antonio Stradivari**

- His life in Cremona, northern Italy
  - 1644, year of his birth
  - 1658–1664, a pupil of Nicolò Amati (?)
  - 1680, opened his workshop in Cremona
  - His reputation was soon established.
- He made ca1100 stringed instruments
  - ca 750 were violins
  - ca 450 have survived
  - Along with thousands of copies, imitations, and fakes
- Died in 1737

How Valuable is a Strad?

- On May 16, 2006, Christie's auctioned *The Hammer* for $3,544,000
- On April 2, 2007 Christie's sold *The Solomon, Ex-Lambert* for $2,728,000
- On October 14, 2010, the "Molitor" was sold for $3,600,000
- In 2011, the "Lady Blunt sold for $15,800,000 (the current record)

A Recent Offer—*The Kreutzer*

- Owned by a reclusive U.S. heiress to a copper fortune
- Offered by Christie's for $7.5 million or above
- The sale was conducted by sealed bids
- The violin is from the estate of Huguette Clark
  - Who spent her final decades living in a New York hospital
  - She died in 2011 at the age of 104
  - The violin was found in a closet, where it had been for 25 years
- Result: The violin failed to sell at the reserve price

Why are Strads so wonderful?

- The secret of his violins remains a matter of dispute
- Was it...
  - The varnish
  - The design
  - The method of construction, or
  - The **density of the tree rings**

The Little Ice Age

- In Europe over the years 1500-1800
  - There was a “Little Ice Age”
  - Temperatures fell significantly
- Tree growth was slowed
  - Thus, tree ring density in woods increased
- In violins of the period—37 rings per inch
  - Modern violins—15-25 rings per inch
- This increased density gives a more vibrant sound (perhaps)
The Messiah

- Made by Stradivari in 1716
  - His “Golden Period”, 1700-1720
- The most famous of his instruments(?)
- Now owned by the Ashmolean Museum at Oxford

History of the Messiah—The First Century

1716  Completed but sold after Stradivari’s death in 1737
  Why unsold? His favorite? Seriously flawed?
1737  Upon death, passed to his son Paolo
1775  Sold to Count Cozio di Salabue, collector
1827  Upon death, sold to Luigi Tarisio, collector and dealer

The Second Century

1855  Upon death, sold to Jean-Baptiste Vuillaume, dealer and maker
1875  Upon death, passed to daughters, then to son-in-law Alard
1888  Alard died
1890  Sold to W.E. Hill and Sons, dealers
1939  Donated to the Ashmolean Museum at Oxford
2010  On permanent display at the Museum

Doubts Surface

- Provenance
  - It only appeared in public after being "acquired" by Vuillaume (was it made by him?)
- Connoisseurship
  - It was stylistically different from other Strads of the same period.
  - Its condition (almost perfect) was unusual for a 300-year-old instrument.
  - Was it too good to be true? (Always a question to be asked)

The Ashmolean Asks for Help

- The Ashmolean decided to enlist science
- Dendrochronology should reveal the true date

The First Attempt

- Stewart Pollens
  (Conservator of Musical Instruments at the Met)
  - Took close-up photos
  - Sent to a dendrochronologist
- From the photos
  - Date of felling—1738
  - Terminus post quem—1738
- Death of Stradivari—1737!

The Messiah a Fake?

- Pollens asserts—The world's most celebrated Stradivarius violin is a fake
- The Messiah—Estimated to be worth some $20 million
- Pollens, an American, held his ground

The Donor Family Responds

- The Hill family commissioned their own dendrologist, a Brit
  - John Tophan, self-taught dendrologist
  - Examined the rings on the violin itself (not photos)
- His conclusion
  - Terminus post quem was 1682
  - A result compatible with authenticity
- Some professionals considered his work “amateurish”
- The controversy continued
The Violin Society of America Intercedes

• Assembled a team of respected dendrochronologists
  – The leader—Henri Grissino-Mayer of the University of Tennessee
• The team
  – Visited Oxford
  – Removed the strings
  – Studied the violin with the correct microscope

The Team’s Approach

• They dated the violin against the European regional chronology
• They compared the tree ring spacing with two other instruments, violas, authentic Strads
  – The Archinto dated to 1687
  – The Kux/Castelbarco dated to 1684

The Results of the Comparisons

A—the regional chronology
B—the Archinto
C—the Kux/Castelbarco
D—the Messiah

Their Conclusions

• The Messiah had a terminus post quem of 1687
• Putative date of construction, 1716
• "We can't confirm that this is a Stradivari, but we can say it's in the right time frame."

The Messiah hangs in the Ashmolean with its identifying plaque

Carbon-14 Dating

Atoms, Isotopes, and Radioactivity—An Introduction

What is an atom?
• The simplest particle of an element
• It has a nucleus made up of
  – Protons (charge +1)
  – Neutrons (charge 0)
• Surrounded by electrons (charge −1)
• The number of protons equals the number of electrons, so the atom is neutral

What are isotopes?
• Atoms of an element that differ in the number of neutrons
• But their chemical properties are very close
• Example—the three isotopes of hydrogen
  – Hydrogen $^1$H
  – Deuterium $^2$H
  – Tritium $^3$H

The Notation of Isotopes

• Li stands for Lithium
• "3" means three protons
  – All lithium atoms have three protons
  – And three electrons
• "6" means six neutrons
  – The number of neutrons in an atom may vary
  – The three isotopes of lithium have 6, 7, or 8
Radioactive Isotopes

- When there are a lot more neutrons than protons in an isotope
  - The nucleus is unstable
- It then decomposes
  - Ejecting particles and energy and
  - Forming a new kind of atom
- This is a radioactive isotope
- Of the isotopes of carbon and oxygen, only C-14 is radioactive

Radioactive Decay of C-14

What accounts for the above is:

\[ ^1n \rightarrow ^1p + e^- \]

The number of neutrons is reduced and stability is restored

Measuring Radioactivity

- A Geiger counter is used
  - It clicks every time a particle strikes the detector
  - For example \( ^{14}C \rightarrow ^{14}N + e^- \)
  - Followed by \( e^- + \text{detector} \rightarrow \text{“click”} \)

Half-life of a Radioactive Isotope

- The time (in years) required for exactly one-half of the radioactivity to be lost through decay
- Examples: Tritium 12.3 years
  Carbon-14 5,730 years
  Uranium-238 4.47 x 10^9 years or 4½ trillion years

Carbon-14 in the Atmosphere

- Willard Libby studied cosmic radiation
  - High energy particles from outer space
  - They bombard earth’s atmosphere and
  - Cause atoms to disintegrate
- The cosmic ray reaction produces C-14
  - Cosmic rays + atoms \rightarrow neutrons
  - Neutrons + nitrogen \rightarrow C-14 + proton
  - C-14 + oxygen \rightarrow carbon dioxide

Formation of Carbon-14

\[ ^1n + ^{14}N \rightarrow ^{14}C + ^1p \]

C-14 Enters the Food Chain

- C-14 is oxidized to carbon dioxide (\(^{14}CO_2\))
- The \(^{14}CO_2\) is dispersed throughout the atmosphere
- The carbon dioxide enters the food chain
  1. \(^{14}C + O_2 \rightarrow ^{14}CO_2\)
  2. \(^{14}CO_2 + H_2O \text{ (photosynthesis)} \rightarrow ^{14}C_6H_{12}O_6 \text{ (glucose)}\)
  3. \(^{14}C_6H_{12}O_6 \rightarrow \text{cellulose & many other organic materials}\)

\(^{14}CO_2\) Becomes Cellulose-14, Food

Plants and animals ingest Cellulose-14, which is then incorporated into their tissues
Decay and Regeneration of $^{14}\text{CO}_2$

- Decay
  $$^{14}\text{CO}_2 \rightarrow ^{14}\text{N} + e^- + \text{O}_2$$
- Regeneration
  $$^{14}\text{N} + ^1\text{n} \text{ (from cosmic radiation)} \rightarrow ^{14}\text{C} + ^1\text{p}$$
- Then, as before
  $$^{14}\text{C} + \text{O}_2 \rightarrow ^{14}\text{CO}_2$$
- This cycle results in a steady state
  - $^{14}\text{CO}_2$ is a constant fraction of in the earth's total CO$_2$
  - Or, just as much forms as decays
  - The percentage remains 0.0000000001%

Steady State in Living Things

- $^{14}\text{C}$ is decaying in living things
- But living things constantly take in more $^{14}\text{C}$
  - Plants directly from the air ($^{14}\text{CO}_2$)
  - Animals by eating plants
- Thus, all living things will maintain the steady state percentage

The Death of an Organism

- When a plant or animal dies
  - It ceases to take in C-14
  - So, the C-14 decays without being replenished
- The radioactivity in the organism now decreases by one-half every 5730 years
  - After 11,460 years, it will be one fourth
  - After 17,190 years, it will be one eighth
  - And so on

Change in Radioactivity over Time

The aging log loses one-half its natural radioactivity every half-life

Carbon Dating

- Willard Libby’s Plan
  - Measure the C-14 in the sample to be dated
  - Compare with the C-14 in a living organism
- From the diagram, the number of half-lives can be found
  - And thus the number of years that have passed since the organism died

What can be dated by C-14 analysis?

- Animal matter
  - Bones, ivory, horn, eggshell, leather, woolen cloth
- Plant matter
  - Wood, charcoal, paper, seeds, cotton and flax cloth

Is the method valid? — Libby’s First Experiment

- Measure C-14 in methane from a petroleum deposit
  - An ancient sample, expected to show no activity
- Compare with C-14 from methane produced from garbage (Baltimore)
  - This is recently produced, expected to show contemporary activity
How is the experiment conducted?

- Because of the low concentration of C-14
  - Pure carbon is needed
- Purification
  \[ ^{14}\text{C} \text{(organic matter)} + \text{O}_2 \text{ (burn)} \rightarrow ^{14}\text{CO}_2 \]
  \[ ^{14}\text{CO}_2 + \text{H}_2 \rightarrow ^{14}\text{C} \text{(purified)} + \text{H}_2\text{O} \]
- The activity of contemporary carbon is 15.3 ± 0.5 dpm/g (disintegrations per minute per gram)

The Result

- The old methane had zero activity
- The new methane had contemporary activity
- Libby’s method was found to be valid
- He would soon be awarded the Nobel Prize in Chemistry for this revolutionary research

Libby's First Dating Experiment

- From Ambrose Lansing, Director of the Metropolitan Museum of Art in New York (1947)
  - Acacia wood from the tomb of Zoser at Sakkara
- Any help in dating the sample would be most appreciated

The Result

- The C-14 analysis of the wood
  - Gave an age of 4650 ± 75 years BP
  - BP means Before Present (1950)
- This date translated to 2700 ± 75 years BCE
- All agreed—an excellent result

Libby’s Second Dating Experiment

- A piece of wood
  - From John Wilson, Professor of Archaeology at the University of Chicago’s Oriental Institute
  - Supposed date of 300 BCE or 2250 BP.
- The C-14 test revealed 0 years age!
  - Wilson had sent a modern forgery by mistake
  - The result was later confirmed
- So this test was also a success, sort of

Summary of the C-14 Method

- The Steady State
  - Production
    \[ \text{cosmic rays} + ^{14}\text{N} \rightarrow ^{14}\text{C} \]
  - Decay
    \[ ^{14}\text{C} \rightarrow ^{14}\text{N} + \text{e}^- \]
- Because production and decay are equal...
  - The concentration of C-14 remains constant
  - It is 0.0000000001% of all carbon
- This the concentration in the atmosphere
- And in living things

Measurement of C-14

- The steady state concentration of C-14 is 0.0000000001% of carbon
- Using a Geiger counter...
  - This concentration gives a reading of 15.3 dpm/g
- All living things will show this reading
Then, the Organism Dies

- Now, only decay of C-14 occurs
  \[
  ^{14}\text{C} \rightarrow ^{14}\text{N} + \text{e}^-
  \]
- The quantity of C-14 gradually decreases
- And the rate of this decrease is always the same
  - One half of the C-14 is lost in 5730 years
- So, when the dead organism is measured after 5730 years...
  - It shows a reading of \( \frac{1}{2} (15.3) = 7.65 \text{ dpm/g} \)

The Measured Radioactivity Gives the Age

Example of an Age Calculation

- An archaeological dig reveals
  - A piece of bone
- The bone is burned to CO\(_2\)
- The CO\(_2\) is converted to pure carbon
- The radioactivity is measured
  - The result is 9.80 dpm/g
  - This corresponds to an age of 4150 year BP
  - Or, a chronological age of 2200 BCE

The age is calculated from the radioactivity

The measured radioactivity of 9.80 dpm/g corresponds to an age of 4150 BP or 2200 BCE

Validation

The validity of C-14 dating is shown by comparing radiocarbon dates with known historical dates.

The Underlying Assumptions

- Two conditions must be true
  - Cosmic radiation must have been constant
    - So that the production of C-14 was constant
  - Geographical distribution of C-14 must be uniform
- Neither assumption is exactly true
  - Variations in the earth’s magnetic field cause changes in the intensity of cosmic radiation
- But by comparing C-14 dates with dendrochronology dates...
  - Calibration curves can be constructed

High Precision Radiocarbon Dating

- High-precision calibration curves of RC dates
  - This task was begun in the 1980s
  - RC dates were compared to dendrology dates
  - Two research labs were involved
    - University of Washington, Seattle
    - Queens University, Belfast, Ireland
  - The range covered is 2500 BC to 2000 AD
- The reliable conversion of RC dates to calendar dates is now possible

Carbon-14 and the Bomb—Big Changes—

- Starting in ~1955
  - Atmospheric bomb testing began
  - C-14 in the atmosphere doubled
- “Synthetic” \(^{14}\text{CO}_2\) was rapidly taken up by organisms
  - It became part of the biological chain
  - From contemporary tree rings to vintage wine
- After the test ban (1963), it began to decline
  - The current level is ~110% of normal
Effect of Bomb Testing on Atmospheric Carbon-14—Notes

- Green line—northern hemisphere (NH)
- Red line—southern hemisphere (SH)
- Testing was primarily in the NH
- PTBT means “Partial test ban treaty”, Oct., 1963
- The NH and SH values became equal in 1968
  - Shows atmospheric mixing occurs rapidly

Unintended Consequences

- Because of the spike in C-14 after 1955
  - It is now possible to date exactly (±1 year) any organic material collected after 1955
- The high level of C-14 pinpoints the period
  - But two dates will be possible for many materials
- Example: If a sample has pMC of 170, it dates to either 1963-4 or 1967

Some Problems

- Sample Size
  - Because C-14 is so dilute, large samples were formerly required
- Certain periods are difficult to date
- The backward time limit
  - 40,000 to 60,000 BP is the earliest possible
  - Before this, there is too little C-14 to detect

The Stradivarius Gap

- The period 1650 to 1950 in difficult to date by RC
- The reason
  - Changes in the earth’s magnetic field
  - Caused irregular cosmic radiation
  - Caused variations in the production of C-14
  - So, varying amounts of C-14 taken up by organisms
- Dates in this period should be confirmed by external evidence
- Because the violins made by Antonio Stradivari (1644-1737) fall within this period, it is called the Stradivarius Gap.

Accelerator Mass Spectrometry (AMS)

- In 1977, a new method was developed
  - Instead of counting decompositions of the C-14 atoms
  - Mass spectrometry allows individual atoms of C-14 to be counted
- The sensitivity increased 10,000 times
  - Instead of 10 g of sample, only 0.001 g of sample are required
- Also, the range backward in time was increased from 20,000 to 60,000 BP
- The downside—Very expensive and elaborate equipment

AMS Method

- Detect the isotopes of carbon as CO₂
  - ¹²CO₂ has mass 44
  - ¹³CO₂ has mass 45
  - ¹⁴CO₂ has mass 46
- Direct counting of ¹⁴CO₂ molecules increases sensitivity of the method

An Application of C-14 Analysis—The Case of the Persian Mummy

- In October, 2000, Pakistani police confiscated a wooden sarcophagus...
- Containing a stone coffin...
- In which was a linen-wrapped body of a young woman
- A man claimed he found it after an earthquake
Pakistani Archaeologists Examined the Mummy

- Its Features
  - Wore a golden crown, mask, and breastplate
  - Bore an inscription in cuneiform which dated the mummy to 600 BCE
- This was the first ever of a royal Persian mummy
  - Perhaps the most important treasure unearthed here
  - It would be worth millions

Questions Arise

- Problems with the inscription
  - The literary style was not Old Persian
  - There were grammatical errors
  - Words were used that did not exist in 600 BCE
- Other problems
  - Microscopic pencil marks on the wood
  - Traces of modern detergent were found
  - A CT scan suggested that the body was a modern woman
  - Perhaps one who had been murdered to provide a body

Sounds like a job for Captain C-14!

- C-14 analysis of the mummy was carried out in Germany in 2003
- The results of the analysis:
  - The C-14 content was greater than the 1955 base value
    - Found, 115% of the 1955 value
    - Expected, 75% for the proposed date of 600 BCE.
- Conclusion: The mummy was dated to the post-bomb era after 1960
- Further analysis
  - Bone C-14 (115%), skin C-14 (111%)
  - The lower value for the skin (known to have a more rapid exchange with environmental C-14 than bone) narrows the date to the declining years of the post-bomb era
- Conclusion: The C-14 date of the mummy was 1994-1996.

Conclusion

- The mummy was a forgery
  - Intended to deceive archaeologists
  - And sell for millions on the black market
- The 600 BCE “Princess” was really
  - A middle-aged woman with dyed blonde hair
  - Who died of a broken neck in about 1996
  - Either murdered or grave-robbed

Next Case of C-14 Analysis and Confirmation by Dendrology—The Courtrai Chest

The Battle of Courtrai

- In 1302, the people of Bruges rose up—against the French
  - Who had just annexed Flanders
- The French in Bruges were massacred
  - The French leaders responded
- The famous Battle of Courtrai resulted
  - The Flemish against the French—Near Kortrijk (Courtrai)
- Result—a victory for Flanders
  - July 11 is now a national holiday for the Flemish community
The Chest is Discovered
• In 1905, W.A. Spooner, Warden of New College Oxford
  – Discovered the carved chest at a farm near Oxford
  – The carvings were said to depict the Battle of Courtrai
  – The date of the chest was believed to be 14th century
  – Carved representations of human figures of this date are very rare

A Forgery?
• In 1978, examination at the Royal Institute in Brussels
  – Declared to be a 19th century forgery
  – Based on art historical grounds
• In Oxford, the chest was re-examined
  – Both dendrology and C-14 analysis were used

The Dates
• Dendrology gave the date of felling
  – ca 1250
• Carbon-14 gave the most probable date of tree death
  – 1280±70
• Dendrology and C-14 agree on the date of the wood
• The date is close to the date of the battle (1302)
  – The chest could have been carved soon after
• The results are strongly suggestive but not definitive
  – The chest could have been carved in the 19th century from 14th century boards

Next Case of C-14 Analysis and Disagreement with Dendrology—King Arthur’s Round Table

History of the Round Table
• First mentioned in 1155
  – In a history of Britain
• King Arthur (ca 480 to ca 540)
  – Devised the Round Table to prevent quarrels
  – All the knights wanted precedence
  – The round table has no “head”
• And, there is an actual physical Round Table

The “Round Table” of Winchester Castle
• First recorded at Winchester Castle in 1463
• It is 18 feet in diameter
• The names of 24 knights
  – Are painted around the periphery
• It is mounted on the wall of the great hall of the castle

What is the likely date of the table? Three dates are considered
• 500 if it is King Arthur’s own
• 1290 if built by Edward I
  – He held a great Arthurian tournament
• 1344 if built by Edward III
  – He established the Order of the Round Table
The Dating is Performed

- Dendrochronology
  - Date of felling: 1255
  - Followed by construction in 1270
  - Supports Edward I’s tournament in 1290
- Carbon-14 dating
  - Date of felling: 1330±10
  - Date of construction: 1340
  - Supports Edward III’s founding of Order of the R.T.

Conclusion

- These contradictory results cannot be reconciled
  - Both methods were done scrupulously
  - Science has no answer for this
- Round Table scholar (Martin Biddle) states:
  - Historical evidence supports the earlier date
  - The table was probably built for the occasion of Edward I Arthurian themed tournament at Winchester in 1290

Dating Ceramics—Thermoluminescence

Pottery

- Pottery is clay
  - That has been molded, dried and fired
  - At temperatures of 600-1000 degrees Celsius
- The oldest pottery objects
  - Are human figures dated to 27,000 BP
  - Vessels are known from 12,000 BP

Gravettian Figurines

- Named for the La Grevette site in the Dordogne
- The earliest known ceramics
- Dated 29,000 to 25,000 BCE
- They are called “Venuses”

Clay

- Clay is composed of fine grains of silicates including
  - Quartz, zircon, and feldspar
- Also present are trace amounts of radioactive elements
  - Uranium, thorium, potassium-40, and rubidium-87

Radioactive Decay in Clay

- As the radioactive elements decay
  - They release energetic electrons (e−)
  - Most of which escape
- A few of the electrons are trapped
  - In “holes” (or flaws) in the crystals
- These electrons remain in the clay
  - Indefinitely
  - In a highly energized state
Radioactive Decay in Clay (cont)

- A typical radioactive decay sequence is the following
  - Rubidium-87 ($^{87}\text{Rb}$) decays to Strontium-87 ($^{87}\text{Sr}$)
  $$^{87}\text{Rb} \to ^{87}\text{Sr} + e^{-} \text{ (high energy)}$$
- Then $$e^{-} \text{ (high energy)} + \text{ crystal } \to e^{-} \text{ (trapped)}$$

**Luminescence**

- When the clay is fired to at least 600°C
  - All atoms vibrate vigorously
  - The electrons can now escape from the holes
  - They give up their energy as light
- That is luminescence or a glow
- Once the electrons have escaped, reheating will produce no additional luminescence
  $$e^{-} \text{ (high energy, trapped)} + \text{ heat } \to e^{-} \text{ (low energy, free)} + \text{ light}$$

**Dating by Thermoluminescence**

- Upon firing, all trapped electrons escape
- After firing, radioactive decay resumes
  - Now, energetic electrons re-accumulate
- When reheated, a second luminescence occurs
  - Its intensity depends on the time since the first firing
  - This luminescence is measured
- The intensity of this second luminescence tells the date of the first firing

**The Glow Curve**

- When first heated, luminescence is observed
- When reheated, luminescence is not observed

**The Equipment is Relatively Simple—Schematic**

The sample is heated by a furnace with a photomultiplier adjacent. As light is given off, the light intensity versus temperature is recorded to a temperature of about 500°C

**Calibration of TL**

- The luminescence is proportional to the time since the kiln firing
- By measuring the luminescence, an approximation of the date of the kiln firing is obtained
- To 2500 BCE, the method shows good reliability
  - A precision of ±200 years is found
  - Prior to 2500 BCE, reliable dates cannot be obtained

**TL, what is it good for?**

- Is an object is old or a modern forgery?
  - TL will give you a useful answer
  - Ceramics 1000 to 10,000 years BP...
  - Will give a meaningful TL curve
- Is an object...
  - An authentic 18th century ceramic or...
  - A 19th century reproduction?
  - TL is not fine enough to give a definitive answer

**Example: Authentic Greek?**

- Amphora in the Danish National Museum
- Authenticity questioned on stylistic grounds
- Was it a modern forgery?

**TL Dating**

- TL showed that the date of firing was prior to 425 BCE
- The result is consistent with an authentic piece of Greek pottery
Zapotec Ceramics

- The Zapotec culture
  - About 200 CE to 800 CE
  - In the state of Oaxaca
- Their pottery was distinctive
  - Human or zoomorphic form
  - Examples were present in many collections throughout the world
- But how many are authentic?

Monte Alban—Capital City of the Zapotecs

Archaeology at Monte Alban (1931)

- Systematic archaeology began in 1931
  - 1931-49
  - 1958
  - 1992-94
- Zapotec ceramics appeared on the market earlier
  - By 1900, available from dealers, but without provenance
  - Many had stylistic problems
  - Many were suspect
- By the time of TL (1970s), there was much to authenticate in the world of Zapotec ceramics

Sequence of Zapotec Forgeries

- From 1910 to 1950
  - Demand was high
  - Few genuine objects were available
  - Forgers flourished
- After 1960
  - Many archaeological sites were discovered
  - Genuine objects were available
  - But most had been looted
- It was now easier to loot than to forge

Museums Now Dated their Holdings

- The Peabody Museum of Harvard
  - Six Zapotec pieces
    - Obtained between 1900 and 1930
    - By TL dating, all six were forgeries
    - Date of firing was post-18th century
- The Saint Louis Museum of Art
  - They had 101 pieces
    - Obtained 1966 and 1972
    - Only five were found to be fakes
    - Easier to loot than to forge

An Example from the Royal Ontario Museum

- The founder of the museum, Charles Currelly
  - Visited Mexico in 1919
  - Obtained a collection of clay urns
  - Zapotec, dated 200-500 CE
- Prominently displayed for decades
- Then TL dating appeared
- The majority were fake
Fake and Genuine Zapotec Urns
- Authentic urn in the shape of a seated male (Zapotec, 200-500 CE)
- Fake urn in the shape of Cocijo, god of rain (Zapotec style, early 20th century)

Haçilar, an Archaeological Find

The Story of the Haçilar Ceramics
- Excavation at the site: 1957 to 1960
  - Carbon-14 dating gave 8,700±180 BP
  - Ceramics were dated 7000 BP
    - The early phase of pottery production
- Shortly after 1960, the antiquities market was flooded
  - With objects in the Haçilar style
  - Many were looted, many were forgeries
- As before, TL would answer the questions

Authentic and Fake Two-headed Haçilar Jugs
~10 ½ inches tall

Two Anthropomorphic Vessels
They are four to five inches in height, both authentic

An Expert is Fooled—The British Museum’s authority on Greek and Roman ceramics gets one wrong

A Ceramic Lamp is Featured
- Greek and Roman Pottery Lamps (1972)
  - By Donald M. Bailey
  - The British Museum’s expert in the field
- The cover of the booklet is...
  - "Lamp in the form of a gladiator's helmet
  - Made in Italy, about AD 100"
- Clearly a prized object

A Fall from Grace
- Doubt about the lamp arises
  - Could Dr. Bailey be wrong?
- The answer would lie in TL
  - Dating performed in 1974
- The result: “A maximum age of 190 years”
- Dr. Bailey’s revised assessment...
  - Probably made in Naples for the souvenir market, between 1870 and 1939

Paints and Pigments—How do you forge a painting?

Is it possible to forge a painting by an old master?
- The frame can be dated by dendrochronology
  - A forger can use an old frame
- The canvas can be dated by C-14
  - A forger can scrape the paint off an old canvas
- What about the paints?
  - Can the paints be dated?
- The answer is a qualified “yes”
The Identification of Paint Pigments

• By the early 1900s
  – Chemists had the tools to identify paint pigments
  – These tools are
    The microscope, the ultraviolet lamp, and chemical tests
• From this time on, “white” was not simply white. It was
  – Lead white or
  – Zinc white or
  – Titanium white

The Chronology of Pigment Introduction

• In 1929, A. Martin de Wild published...
  – The Scientific Examination of Pictures
  – Originally in Dutch, soon after in English
• He described...
  – Manufacture, use and characterization
  – Of the pigments used by the Dutch masters
• And a chronology of pigment introduction
• “Anachronistic” pigments could now be identified
• Forgers take note
  – Do not use a pigment before its time

Early Pigments

• Before about 1600
  – Only these twelve pigments were in use in Holland and Flanders
• Discovery of a later pigment would justify a charge of forgery
• For example, zinc white introduced in about 1780
  – Its appearance in an "earlier" work suggests forgery

Example—The Arnolfini Portrait (1434) Jan van Eyck

• All of the pigments used in this painting must have been in use by 1430
• The use of any other pigment would be anachronistic

Dating Pigments

• So, pigments can be dated
  – In the sense that they must not be employed...
  – Before they were discovered or manufactured
• If a forger is careful to use paints of the correct period...
  – Can they still be detected?
  – Again, a qualified “yes”

The Pigments of Antiquity

• White  Lead white  2PbCO₃•Pb(OH)₂
• Black  Carbon black from charcoal, C
• Ochres  Clays containing iron oxide
• Red  Vermillion (China Red)—a form of mercury sulfide, HgS
• Blue  Ultramarine—derived from lapis lazuli
  Azurite, a natural copper carbonate  2CuCO₃•Cu(OH)₂
• Green  Malachite, copper carbonate
  Verdigris, copper acetate
Later Pigments
- Indigo (1610)—The classic blue
- Terre Verte or Green Earth (1630)—Earthy green
- Prussian Blue (1704)—The first modern synthetic pigment
- Zinc White (1780)—Non-toxic lead white substitute

Modern Pigments
- About 27,000
  - Under 13,000 color names
- The human eye?
  - It can distinguish 2,500,000 to 10,000,000 colors
  - Depending on whose estimate you accept

Two Pigments
- We examine two important pigments
  - Lead white
  - Ultramarine
- Both have been used since antiquity
- Both play important roles in forgeries
- Neither is used in modern painting

Lead White—Basic lead carbonate, $2\text{PbCO}_3\cdot\text{Pb(OH)}_2$

Traditional Manufacture
- Metallic lead "buckles"
  - Exposed to vinegar vapors for 3 months in clay pots
  - Then stored with fermenting horse manure, a source of $\text{CO}_2$
    $$\text{Pb} + \text{HC}_2\text{H}_3\text{O}_2 + \text{CO}_2 \rightarrow 2\text{PbCO}_3\cdot\text{Pb(OH)}_2$$
  - The white product is scraped off the buckle
  - Washed, dried and ground in linseed oil
  - The process is repeated until all lead is consumed

Recent Manufacture
- A typical method is the Carter process
  - Granular lead is tumbled in a rotating drum
  - Sprayed with acetic acid
  - Bathed in a stream of hot $\text{CO}_2 + \text{air}$
  - The product is uniformly textured

Lead White Uses—The most important white pigment up to 1800
- Properties: Excellent coverage, blends well with colors, as an undercoat
- The linen of Dutch gentlefolk was done with lead white
- Detail of Vermeer's *Girl Reading a Letter by an Open Window*
  - Shows the use of lead white impasto in the girl's collar

Permanence of Lead White
- Highly stable over many years
  - Unaffected by light
- When coated with linseed oil (the usual case)
  - Resistant to acids and other corrosive agents
- However, airborne hydrogen sulfide, $\text{H}_2\text{S}$
  - Turns lead compounds black
  - By production of black lead sulfide
    $$2\text{PbCO}_3\cdot\text{Pb(OH)}_2 + \text{H}_2\text{S} \rightarrow \text{PbS}$$
  - A coat of varnish will prevents this for centuries
Modern Uses of Lead White
• Because of its toxicity, lead white is now carefully controlled
• It has been replaced in paints by titanium oxide
  – An excellent pigment
  – Low in toxicity.

Dating Lead White through Isotopic Ratios
• Isotopic ratios of most elements are constant
  – For example, those of oxygen are 
    \[ ^{16}\text{O} = 99.763\% , \quad ^{17}\text{O} = 0.0375\% , \quad ^{18}\text{O} = 0.1995\% \]
• The isotopic ratios of lead may vary
  – Depending on the age of the deposit
  – Thus, lead from different regions may show variations in isotopic ratios

Isotopic Ratios Using a Mass Spectrometer
• This MS is similar to that used in carbon-14 work
• By 1965, analysis of lead pigments was routine

Isotopic Ratios in Lead
• The four main isotopes of lead are: Pb-204, Pb-206, Pb-207, and Pb-208
• The ratio of Pb-206 to Pb-204 may vary from region to region
• This is the ratio used in dating

Geographical Variations of the Lead Isotope Ratio (Pb-206/Pb-204)—Significance
• From antiquity through the 18\textsuperscript{th} century
  – Lead white was manufactured from European lead
  – This source gave a narrow range of isotope ratios
• From the 19\textsuperscript{th} century, world trade expanded
• Lead was imported from America and elsewhere
• The range of isotope ratios correspondingly increased

Pb-206/Pb-204 in Lead White of European Easel Paintings by Century
16\textsuperscript{th} century difference is 0.83, 20\textsuperscript{th} century difference 5.08, six times greater

Pb-206/Pb-204 in Lead White of European Easel Paintings by Century
This ratio is always smaller prior to the 19\textsuperscript{th} century

Significance for Forgeries
• Say a painting is suspect
  – Measure the lead isotope ratio of the lead white pigment
• For a painting executed before 1800
  – The Pb-206/Pb-204 ratio must be between 18.00 and 18.80
  – A value outside this range means the lead white is modern
• A value inside the range does not confirm the antiquity of the sample

Advice for the Forger
• It is not sufficient to use lead white as your white pigment
  – You must use lead white with the correct isotope ratio
  – Do you have access to a mass spectrometer?
  – And the skills to use it and interpret the result?
• You might as well be a physicist!
Ultramarine

Source of Ultramarine
- Lapis lazuli a semi-precious stone
  - A mixture of minerals
    Lazurite: \((Na, Ca)_8(AlSiO_4)_6(SO_4, S, Cl)_2\) [blue]
    Sodalite: \(Na_8(AlSiO_4)_6Cl_2\) [blue]
    Calcite: \(CaCO_3\) [clear]
    Pyrite: \(FeS_2\) [metallic gold]
- It has an intense blue color with metallic gold highlights

Extracting the Pigment
- Lapis lazuli is ground
  - The powder is blended with wax, resin, and oil
  - Wrapped in cloth
  - Kneaded in dilute alkali
- Blue particles of lazurite emerge
  - The lazurite is ground
  - This is the ultramarine pigment
- This messy extraction was used from the 13th to the 19th century

The Valuable Pigment
- The yield of pigment is about 3%
- Ultramarine has always been...
  - One of the most costly pigments
  - Equaling or exceeding the price of gold
- Understandably, it was used sparingly by most artists

Ultramarine and Vermeer
- To reduce expenses...
  - Many painters used "azurite" as an undercoat
  - Azurite was a cheaper blue alternative
  - Then, one could use less ultramarine
- Vermeer is known for using only ultramarine
- The Vermeer forger, van Meegeren, also used ultramarine in his copies
  - Modern blue pigments would be anachronistic
  - And could be detected

Examples of the Use of Ultramarine
- Johannes Vermeer, The Milkmaid 1661
- Johannes Vermeer, Woman in Blue Reading a Letter, 1665
- Han van Meegeren, Woman Reading Music, 1936 (Style of Vermeer)
- van Meegeren copying Vermeer

Synthetic Ultramarine—\(3Na_2O\cdot3Al_2O_3\cdot6SiO_2\cdot2Na_2S\)
- Because of the cost of the natural...
  - A synthetic version was sought
- In 1826, it was discovered
  - Commercial production followed in 1828
- Preparation of synthetic ultramarine
  - A mixture of sodium sulfate, clay, silica, sulfur, rosin and charcoal
  - Slowly heated to 750º C
Synthetic vs Natural Ultramarine

- The synthetic pigment's appearance differs
  - Fine, rounded, regular particles
- Natural ultramarine
  - Larger, angular, crystalline forms
- Easily distinguished under the microscope.
- Some experts assert
  - The synthetic lacks the intensity of the natural

Note to Forgers

- You must use natural aquamarine in your fake of an old master—hang the expense!
  - The synthetic is easily detected
- However, one thing in your favor is...
  - The natural pigment cannot be dated...
  - If you use lapis lazuli from Afghanistan to prepare it

Modern Use of Ultramarine

- Little use was made of the natural material after 1800
- None was for sale—forgers had to make it themselves

A Forged Painting is Uncovered by Science (1926)

*The Laughing Cavalier—In the Style of Frans Hals*

The Likely Model—*The Jolly Drinker*, Frans Hals (c1630)

The Story Begins in 1923

- *The Laughing Cavalier*
  - Attributed to Frans Hals (1580-1666)
  - Placed in an auction sale in Amsterdam
- Accompanied by a certificate of authentication
  - Signed by Cornelius Hofstede de Groot
    - An art critic and historian
    - The leading authority on Vermeer
    - Well respected in the art world
- A private sale was arranged
  - The price 50,000 guilders (ca $200,000)

There is a problem...

- A year later...
  - The buyer returned to the auctioneer
  - A scientific exam showed the painting was modern
  - The auctioneer concurred
  - The purchase price was refunded
- The auctioneer sued the seller for fraud
  - The case dragged on for 2 years
  - It was a press sensation in the Netherlands

The Case for the Defense

- Hofstede de Groot
  - The well known art critic
  - Was the chief defender
- His position:
  - Science has no role in authenticating pictures.
  - A connoisseur's opinion should be sacrosanct.
The Scientific Evidence

- Chemical and microscopic examination of the pigments showed the following
  - Synthetic ultramarine (1828) was used for the coat
  - Zinc white (1780) was used for the collar
  - Cobalt blue (1802) was used for the background
- Frans Hals had died in 1666
- The evidence was damning
  - No other expert supported the claim of authenticity

The Case is Settled (1926)

- Hofstede de Groot ended the lawsuit
  - He purchased the painting himself
  - And paid the full price
- All charges were dropped
- Hofstede de Groot never admitted he was wrong
  - He published a pamphlet, "The Eye or Chemistry"
  - Extolling the "eye" of the connoisseur and
  - Denigrating the "test tubes" of the chemist
- He died four years later, his reputation tarnished

What was the painting, really?

- It was probably an early (1923) effort of Han van Meegeren
  - The notorious forger of Vermeers
- He had not yet learned
  - To use paints of the correct period
  - By 1936, his pigment use was perfect

Where is The Laughing Cavalier now?

- At his death, Hofstede de Groot had a considerable art collection
- He donated it to the Netherlands Art History Museum
  - Presumably including the "Cavalier"
- The Museum now has only a black and white photo
- The actual whereabouts of the painting is a mystery

Another Case of Connoisseurship vs Science—The Fortune Teller, attributed to Georges de la Tour

- An unusual work by de La Tour
  - It appeared in public only in 1960
  - Perhaps, suggested one scholar
    - An early work by La tour
    - Or, an advertisement for himself
- George de La Tour (1593-1652)
  - Painted mostly religious scenes...
  - Lit by candlelight

Typical Works by George de La Tour

  *Joseph*, George de La Tour 1642, *The Newborn*, George de La Tour 1648
Where did it come from?
This is the story the dealer tells...
- A French prisoner of war (in Germany)
  - Saw a familiar painting in a book
  - Like a painting owned by his uncle...
  - Living in Degre in France
- In 1949, the painting was transferred to the Abbey of Solesmes
  - It was then acquired by the dealer
- In 1960, it was sold to the MMA
  - Shipped to New York
  - Price unknown but probably $.5 to $.75 million (1960) [$3.5 to $5.5 current dollars]

The Painting Arrives in New York
- It caused a sensation
  - One of only 20 known by the artist
  - Only two others in the U.S.
- (André Malraux, Minister of Culture, was furious at the loss to France of the work—heads rolled)
- In 1961, the painting was authenticated
  - By the leading de La Tour scholar
  - He dated it in the 1630s
- And there the matter sat for 10 years

A Question of Costumes
- In 1970, Diana de Marly, a specialist in 17th century dress, wrote...
  - The costumes were wrong for the period
  - Could not have been made in the 17th cent
  - The young man’s leather jerkin lacked laces
  - It would have been impossible to remove
- The gypsies were incorrectly dressed
- The entire thing was a made-up set of garments
  - Totally inconsistent with La Tours other work

Stylistic Objections
- In 1980, Christopher Wright, a La Tour specialist, wrote...
- The painting is...
  - Artistically inept
  - Dissimilar to the rest of the artist's work
  - Lacking in logic
  - "A lurid exception to La Tour's oeuvre"

Science Enters
- Time for a scientific look at the painting
- In 1981, analytical studies on The Fortune Teller were carried out by
  - John Brealey, painting conservator at the MMA
  - Peiter Meyers, research chemist at the MMA

The Scientific Findings
- Pigment analysis
  - All pigments were consistent with a 17th century date
  - No modern pigments were found
- Lead isotope ratios
  - The lead white was analyzed
  - Pb-206/Pb-204 was found to be 18.429
  - Consistent with lead of the 17th century
  - But a modern origin cannot be excluded
X-ray Analysis
  • X-ray studies showed
    – The painting is by the same hand as "The Cheat with the Ace of Diamonds"
    – This is an accepted (?) La Tour

_The Cheat with the Ace of Diamonds_, George de La Tour, 1634—Painted by the same hand?

Conclusions at the Met
  • The painting is of considerable age
    – Not a modern fake
  • The style and pallet are not inconsistent with the La Tour oeuvre
  • There is no reason to de-attribute this work

Doubters Respond
  • In 1981, Brian Sewell, a specialist in 17th century painting (formerly at Christie's, London) published a letter in Burlington Magazine
    "Those of us who are unhappy with The Fortune Teller as a work by La Tour are unlikely to have our doubts stilled by the technical evidence so far."

Another word against
  • In 1984, Christopher Wright wrote...
    – "The Art of the Forger"
    – He explained why he continued to believe that the painting is a fake
    – And The Cheat too!

A New Piece of Evidence
  • But, in 1981, there was found...
    – An inventory
      • Of the holdings of the early owner, dated 1879
    – The inventory described...
      • "Un grand tableau signé G. de La Tour, représente la Bonaventure, prisé deux cent cinquante francs."
      • "A large picture signed G. de La Tour, representing the “Good Fortune”, price two hundred fifty francs."

  • A very convincing bit of the provenance

The Final Word(s)?
  • Thomas Hoving, late director of the MMA, and a well known skeptic..
    – Was convinced the painting was authentic
  • Wright remains unconvinced
  • Philip Conisbee, late curator of European paintings at the National Gallery of Art in Washington, D.C.
    – Said of Wright in 1996
      "[His] ideas have found no general acceptance. He's really out on a limb. _Wright is wrong!_"

The Met’s website equivocates slightly
"This information may change as the result of ongoing research."

The website today
  • The Fortune Teller
  • Georges de La Tour
    (French, Vic-sur-Seille 1593–1653 Lunéville)
    • Date: probably 1630s
    • Medium: Oil on canvas
    • Dimensions: 40 1/8 x 48 5/8 in. (101.9 x 123.5 cm)
    • Classification: Paintings
    • Credit Line: Rogers Fund, 1960
    • Accession Number: 60.30
    • On view in Gallery 617
As currently displayed in the Met, no mention is made of the authenticity question

Marble and Limestone

The Beginning of Marble

- Marine organisms (such as coral) die
  - Skeletons deposited over millennia
  - Creating a calcium carbonate (chalk) layer
- Upthrusting up by geological forces...
  - Creates white chalk cliffs

Limestone Formation

- The calcium carbonate layer, under pressure, is converted to limestone
  - It is harder than chalk
  - And it also may contain evidence of fossilized organisms
- It can be quarried
  - And used structurally
  - And in sculptures
  - It is softer and less durable than marble

Ancient Limestone Statue—The Guennol Lioness

- The statue is from ancient Mesopotamia
  - Found near Baghdad (1931)
  - It is 3½ inches high
  - Believed to be 5,000 BP
- Owned privately since 1948
- Sold by Sotheby’s in 2007
  - The price, $57 million

Formation of Marble

- Limestone, under pressure and heat
  - Changes to marble
  - Fossils are destroyed
- The calcium carbonate becomes crystalline
  - That is marble or calcite
- Pure white marble is the most desirable
  - Product of the metamorphosis of very pure limestone

Some Historically Important Quarries

- Carrara (Italy)
- Naxos (Greece)
- Paros (Greece)
- Pentelicus (Greece)
- Hymettus (Greece)
- Thasos (Greece)

The Best Marble

- Carrara, a pure white marble
  - Prized since classical times
- Soft, uniform, homogeneous
  - Resistant to shattering
- Light penetrates this stone
  - And is then reflected out
  - Result—a unique luminescence
Dating Marble

- **Facts**
  - Marble contains carbon (CaCO₃)
  - Origin—living organisms

- **Conclusion**
  - Carbon-14 dating should be possible with marble

- **But**
  - Limestone was deposited 100,000,000 to 300,000,000 years BP
  - The limit of C-14 dating is 60,000 years BP

- **Sad but true**
  - There just isn’t enough C-14 left to measure, and...
  - Marble/limestone cannot be dated

The Provenance of Marble

- Although it cannot be dated...
  - Its quarry can often be specified

- **Two methods**
  - Carbon and oxygen isotope ratios (SIA), and...
  - Trace element analysis by Instrumental Neutron Activation Analysis, INAA

- **Neither method is completely reliable**
- **Both are helpful**

Applications of Provenance Determination

- Detection of forgeries
  - The quarry of origin must match the attribution

- Separated fragments
  - Pieces of statues can be matched

- Trade patterns
  - Trade routes in the ancient world can be traced by following the shipments of marble

Isotopic Composition of Marble (SIA)

- The stable isotopes of carbon and oxygen
  - $^{13}$C and $^{14}$C, and $^{16}$O and $^{18}$O

- The ratio of isotopes remain constant, mostly
  - That is, $^{13}$C/$^{12}$C and $^{18}$O/$^{16}$O are constant

- But, under the extreme conditions of marble formation
  - Slight fractionation may occur
  - And the ratios, $^{13}$C/$^{12}$C and $^{18}$O/$^{16}$O
  - Will show differences from quarry to quarry

Measuring Isotope Ratios

- A mass spec is used to measure the ratios
- The device is set up to detect the isotopes of carbon as CO₂
  - $^{12}$CO₂ has mass 44
  - $^{13}$CO₂ has mass 45
  - $^{14}$CO₂ has mass 46

Calculation of Isotope Ratios

- The ratios $^{13}$C/$^{12}$C and $^{18}$O/$^{16}$O
  - $^{13}$C/$^{12}$C = 1.10/98.90 = 0.0111
  - $^{18}$O/$^{16}$O = 0.200/99.76 = 0.002005

- However, a world standard has been chosen
  - Pee Dee Belemnite (PDB)
  - A limestone from South Carolina
  - $^{13}$C/$^{12}$C (PDB) = 0.0112372
  - $^{18}$O/$^{16}$O (PDB) = 0.0020672

- All marbles and limestones are compared to this
Comparing Marble Samples

- All marble samples are compared to PDB
- The calculation takes the form:
  \[ \delta^{13}\text{C} (\text{‰}) = 1000 \left[ \frac{(13\text{C}/12\text{C})_{\text{sample}}}{(13\text{C}/12\text{C})_{\text{PDB}}} - 1 \right] \]
  \[ \delta^{18}\text{O} (\text{‰}) = 1000 \left[ \frac{(18\text{O}/16\text{O})_{\text{sample}}}{(18\text{O}/16\text{O})_{\text{PDB}}} - 1 \right] \]
- The results are plotted as...
  - \( \delta^{18}\text{O} (\text{‰}) \) versus \( \delta^{13}\text{C} (\text{‰}) \)

A Sample of Parian Marble, Venus de Milo

Results of the Stable Isotope Analysis
- \( \delta^{13}\text{C} (\text{‰}) = +4.58 \)
- \( \delta^{18}\text{O} (\text{‰}) = -2.82 \)

Isotope Ratios for Several Quarries

\( \delta^{13}\text{C} (\text{‰}) \) vs \( \delta^{18}\text{O} (\text{‰}) \)

Meaning of the Plot
- Each point represents the isotope ratio from a marble object
- An object sculpted from Paros marble (Parian) will be in a different field from one made from Naxos marble (Naxian)
- Some cases are not always clear
  - Naxos vs Penteli, for example

An Application of Isotope Ratios—A Roman statue is in doubt: Was it partially reconstructed?

Antonia the Younger, c. AD 37-54

- Sculpture
  - Roman, 1st century AD
- Harvard Art Museum
- There seemed to have been a restoration
  - It was analyzed
  - Five pieces were identified

The Five Pieces
- The five pieces were as shown
- The determination of the isotopic ratios was done
- The results and the assigned provenances are given in the table

Plot of the Five Points

I—Parian, authentic
III, V—Parian from another statue
II, IV—Carrara, more recent additions (after 1678)

Conclusions
- Antonia is authentic
  - First century CE
  - Dated 31 BCE to 98 CE
- The original statue was damaged
  - The head survived
- A restoration was done
  - The torso and part of the hair were replaced
- The work was probably done in a Roman workshop
- The Provenance
  - Lord Arundel, early 16th century, acquired it in Italy
    - He may have ordered the restorations
  - Eighth earl of Pembroke, 1678
  - Harvard Art Museum, 1974 (SIA analysis answers the questions)
Another sculpture is authenticated (?) by SIA—The Head of Achilles

Head of Achilles

- The Greek sculptor Skopas built a temple to Athena at Tegea (ca 394 BCE)
  - It is believed to have served as a refuge for the kings of Sparta
- The temple today lies in ruins
  - A head of Achilles from the site...
  - Is in the National Archaeological Museum in Athens

The Temple to Athena at Tegea

Drawing of the Interior

The temple today

Head of Achilles

- The Head of Achilles is now in the National Archaeological Museum in Athens

Head of Achilles II(?)

- In 1979, a second head appeared
  - Offered for sale to the Getty
  - Price $2.3 mil
- Examined by art historians
  - Found to be authentic and...
  - Also from the temple at Tegea
- Provenance (according to the dealer)
  - In a private collection until 1925
  - Then in a museum in Angers, which closed
  - Now available
- The Getty purchased it

- Appearance of the two heads...
  - Almost identical
  - But the second in much better condition
- It must have come from the same sculptural group
  - In the same monument
  - Certainly of the same marble

Note: The authentic head had been repaired

- The head in Athens had a repaired helmet
- Some scholars believed the helmet had been incorrectly repaired

The original visor?

- Should the helmet have shown a peak?
- If so, it was incorrectly repaired
- And the Getty head was a copy based on an incorrect version

Suspicions Aroused

- Scholars around the world doubted
- Earlier correspondence (1932) with the MMA emerged
  - It had been offered for sale
  - Refused as a fake
- Marion True, Getty curator of antiquities
  - Ordered the crucial test, isotopic analysis
  - If genuine, the marble would be the same
- Prof. Stanley Margolis of UC Davis conducted the tests

The Results

- The Athens head was made from Doliana marble
  - Very near Tegea
- The Getty head was made from Parian marble
  - Remote from Tegea
Conclusions

- The Getty head was clearly a copy
  - Undoubtedly later
  - Possibly modern (?)
- Not worth $2.3 mil—The Getty sued the dealer

A Case Where Isotope Ratio Analysis Fails

Head Of Pan

- The Cleveland Museum of Art
  - Acquired the head (1926)
  - Limestone, 13½ inches high
  - Viewed as goat-like
- Believed to represent Pan
  - God of herdsman
- On stylistic grounds...
  - Assigned to ca 489 BCE

Provenance

- The dealer’s statement
  - Found near the Acropolis (Athens)
- Part of an important monument(?)
  - To the Athenian victory over the Persians
  - Mentioned by Herodotus
- Authenticity study
  - Compared to two fragments of limestone
  - From that part of the Acropolis
  - Labeled AM-1 and AM-2

West End of the Acropolis

- The samples were analyzed
  - $\delta^{13}C$ (%) and $\delta^{18}O$ (%) calculated
  - There is no discernable pattern
  - AM-1 and AM-2 should be close—But are not
  - The heterogeneous nature of limestone may be the cause
  - Unlike marble

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>$\delta^{13}C$ (%)</th>
<th>$\delta^{18}O$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1</td>
<td>+0.62</td>
<td>−2.16</td>
</tr>
<tr>
<td>AM-2</td>
<td>−0.08</td>
<td>−1.51</td>
</tr>
<tr>
<td>Pan</td>
<td>+0.48</td>
<td>−0.95</td>
</tr>
</tbody>
</table>

Plot for Head of Pan and Comparisons

- No clear pattern emerges
- SIA had failed with limestone

A Second Method May Work

Instrumental Neutron Activation Analysis or INAA
First suggested by Robert Oppenheimer in 1956

Instrumental Neutron Activation Analysis or INAA

- In an atomic reactor (source of neutrons)
  - The marble sample is placed in a beam of neutrons
- Trace elements in the sample react with neutrons
  - New elements are formed
  - Many are radioactive
- These new radioactive elements quickly decay
  - The emitted gamma radiation is measured
  - Over the course of about a half hour
- From these gamma rays, the trace elements can be found
The INAA Reaction
\[ n + ^{23}\text{Na} \rightarrow [\text{Compound Nucleus}] \rightarrow ^{24}\text{Na} + \gamma \]
\[ ^{24}\text{Na} \rightarrow ^{24}\text{Mg} + \beta^- + \gamma \]

Typical INAA Spectrum
- The trace elements are identified by peaks and...
- Converted to ppm

INAA on the Head of Pan
- INAA was done on Pan, AM-1 and AM-1
- Trace element concentrations for AM-1 and AM-2 agreed
- The head of Pan differed significantly

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>Lanthanum (ppm)</th>
<th>Thorium (ppm)</th>
<th>Ytterbium (ppm)</th>
<th>Uranium (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-1</td>
<td>3.30</td>
<td>0.75</td>
<td>0.21</td>
<td>2.57</td>
</tr>
<tr>
<td>AM-2</td>
<td>3.32</td>
<td>0.76</td>
<td>0.20</td>
<td>2.61</td>
</tr>
<tr>
<td>Head of Pan</td>
<td>8.53</td>
<td>0.53</td>
<td>0.91</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Conclusions
- The two Acropolis pieces are related
  - Probably from the same quarry
- The Head of Pan is not related
  - Probably not from limestone found near Athens
- The Cleveland Museum head of Pan...
  - Was not part of the monument to the Athenian victory over the Persians mentioned by Herodotus

The Future of INAA
- It is non-destructive, but
  - The irradiated sample remains radioactive for many years
  - Requires handling and disposal procedures
- The number of suitable nuclear reactors is declining
  - Thus, the technique has declined in availability
  - And become more expensive.

Metals

Dating Metals
- Metals do not undergo any aging process
  - Lead is an exception
- Age or provenance must be found by...
  - Examining secondary characteristics
    - Physical appearance
    - Trace elements
    - Alloying metal
- We will examine two metal groups
  - Copper and brass
  - Silver
Copper

- **Etymology**
  - Roman copper came from Cyprus
  - Its name was *Aes Cyprium*
    - “Metal of Cyprus”
  - Corrupted to *cuprum*, the Latin word

- **English copper** from the Latin word

- The chemical symbol for copper
  - Cu, derived from cuprum
  - And chemical names such as cupric chloride, CuCl₂

**History of Copper Use**

- **Native copper**
  - First used ca 8000 BCE
    - Neolithic period
  - Found in the metallic state in nature
  - Beaten into tools and utensils

- **Casting copper**
  - Casting of molten copper follows
  - With the appearance of pottery kilns
    - Temperatures over 1000°C achieved
    - The melting temperature of copper is 1083°C

**Copper Smelting (7000-6000 BCE)**

- **Smelting**
  - The conversion of an ore into the metal
  - Carried out by heating the ore

- **Copper smelting**
  - Discovered in a pottery kiln (?)
  - Bright green and blue copper ores used as pigments (?)
  - When fired, would produce molten copper

**A Copper Ore Produces the Metal**

- Azurite is copper carbonate
  \[2Cu(CO_3)\cdot Cu(OH)_2\]

- When heated, azurite breaks down
  - Releases water and carbon dioxide
  - Changes to copper oxide, CuO
    \[2Cu(CO_3)\cdot Cu(OH)_2 \rightarrow 3CuO + 2CO_2 + H_2O\]

- Finally, the copper oxide changes to the metal
  \[CuO + CO \rightarrow Cu + CO_2\]

**Moche Copper Smelting**

- The Moche New World civilization
  - North coast of Peru
  - Dates, 0-700 CE

- The Moche artists produced the only naturalistic sculpture in pre-Columbian South America

**Copper Alloys—Brass and Bronze**

- **Bronze**, an alloy of copper and tin
  - Harder and tougher than either
  - Used for weapons and objects of art

- **The Bronze Age**
  - 3300 to 600 BCE
  - Bronze played a big role
  - Both in culture and commerce
• **Brass**, an alloy of copper and zinc
  – More malleable than bronze
  – Appeared much later
  – Large scale production ca 100 BCE
  – Widely used through 1000 BCE

**Brass vs Bronze (13th to 17th cent)**

• Bronze continued to be used
  – For statuary and other major castings
• But brass gradually became more prevalent in Europe
  – For basins, bowls, and lamps and other household objects
  – As well as jewelry and dress armor.
• Up to the 17th century, brass basins and plates...
  – Were used as decorative pieces in the home
• Then silver from the New World entered Europe
  – It became the preferred metal for these decorative pieces
• Brass continued to be used
  – For utilitarian housewares and
  – For scientific instruments

**Dating Brass by Zinc Content**

• Early brass making
  – Copper heated with zinc ore (ZnO) and charcoal
    \[ \text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}_2 \] (reduction)
    \[ \text{Zn} + \text{Cu} \rightarrow \text{Brass} \] (alloy formation)
  – In this process, the zinc content...
    – Could not exceed 28% until 1565, and
    – 33% after 1565 until about 1700
• Using zinc metal instead of the ore...
  – Allows zinc content of 30-40% (as in modern brass)

**Chronology of Zinc Content in Brass**

• Early brass—to 1565
  – Copper plus zinc ore
  – Maximum zinc—28%
• Intermediate brass—1565 to 1675
  – Copper plus zinc ore—modified process
  – Maximum zinc—33%
• From about 1700 to present
  – Copper plus zinc metal
  – Maximum zinc—about 40%

**Dating Brass by measuring zinc content**

– Before 1560, zinc content was below 28%
– 1565 to 1675, mostly below 33%, few exceptions
– 1675 to present, up to 40%
• Therefore, a brass sample with zinc content above 33% is almost certainly post-1675
• Unfortunately, that is about all one can say
A Case in Point—Drake’s Plate of Brass
The Discovery, 1936

- Summer of 1936
  - A young man driving on the San Rafael-San Francisco road
  - Had a flat tire
  - Pulled off the road
  - Climbed a ridge to enjoy the view
  - Found a dirty metal plate

- Took it home
  - Later, he mentioned it to a co-worker, a student at Berkeley
  - The friend suggested, "Take the plate to Professor Bolton"

Professor Herbert E. Bolton

- He was 67
  - Near the end of a distinguished career
  - Teaching the history of California
- Was well aware that Sir Francis Drake...
  - Had landed in northern California in 1579
  - At Drake's Bay
- A contemporary account said
  - They “...set up a monument of our being there…namely a plate of brasse…”

Drake’s Landing in California, 1579

A brief aside—Theodor de Bry (1528–1598)

- An engraver, goldsmith and editor
- Lived throughout Europe
- Born in Liege
- Died in Frankfurt
- A prolific illustrator and engraver
  - Published books based on drawings of explorers
  - de Bry never saw the New World

Meanwhile, back in California—Bolton Accepts the Plate as Genuine, 1937

- Professor Bolton had long searched
  - For verification of Drake's visit to California
  - The plate was that proof
- Bolton "analyzed" the plate
  - By comparing its inscription to 16th century accounts
- He then accepted the plate as genuine
  - Acquired it for the Bancroft Library at the University
- His announcement
  "The authenticity of the tablet seems to me beyond all reasonable doubt."

“Science” Concurs, 1938

- Examination in 1938
  - By a committee of chemists and metallurgists
- Findings
  - The plate appeared genuine
  - The brass was from Drake's time
  - The patina was correct
- Conclusion
  "It is our opinion that the brass plate examined by us is the genuine Drake Plate"
36 Years Pass...Then a Distinguished Historian Reopens the Discussion

- Professor Samuel Eliot Morison of Harvard University
  - Reopened the question of the plate's authenticity
  - In his influential 1974 book, *The European Discovery of America, The Southern Voyages*
- He called the plate "a hoax perpetrated by some collegiate joker..."
- His evidence, however, was purely speculative

The Plate is Re-examined

- James D. Hart, Director of the Bancroft
  - Aware of the criticisms and...
  - Thinking of the approaching 400th anniversary of Drake’s Landing (1579 to 1979) and...
  - Conscious of scientific advances since 1938
- Requested a thorough re-testing of the plate
  - By American and European scientists
  - Using the latest methods

The Results

- The plate was of uniform thickness
  - It was AWG No. 8 gauge brass (vintage 1930)
  - Hand hammering in 1579 cannot give this uniformity
  - The zinc content 34.8%
  - Unlikely for a brass produced before 1600
- INAA was carried out for trace metals
  - The plate contained 0.006% tin and 0.10% lead
  - Average for this period is 1.5% tin and 3.0% lead

Conclusion

- Dr. R.E.M. Hedges of Oxford, one of the leading investigators stated
  "I would regard it as quite unreasonable to continue to believe in the authenticity of the plate."
- Now clearly labeled a hoax, the question was “who?” and “why?”

E Clampus Vitus

"The comic strip on the page of California history"

- An organization of California history enthusiasts
- Professor Bolton was a member
- It is dedicated to the perpetration of friendly jokes on its members
- A prank gone awry?
- The contemporary Clampers may have forgotten their honorable history

Our Next Metal, Silver (Ag)

Native Silver

- Early utilization of metals
  - Gold about 6000 BCE
  - Copper about 4200
  - Silver about 4000 BCE
- Little native silver exists in nature
  - About 20% as abundant as gold
  - Usually found in ores along with lead ores
- Because of this rarity, early silver was often more highly valued than gold
Silver Metallurgy

• Smelting of silver
  – The mixed silver and lead ores are roasted
  – The resulting oxides heated with charcoal giving the mixed metals
  – A stream of air converts lead to lead oxide
    • This is absorbed by a porous cup
  – The purified silver can be poured off
• This is known as cupellation

Identification of Ancient Silver

• Guide to the age of silver: gold content
• As time passed...
  – Refiners removed the more valuable gold
• Gold content of silver
  – Medieval European silver—0.1%
  – Post-Medieval period—0.05%
  – 19th century—0.01%
  – After 1900 (electrolytic refining)—0.001%

Example—Roman Silver Ingots

• Silver ingots were used by the Romans
  – To pay their troops and civil servants
  – In the Late Roman Empire, about 400 CE
• Analysis of gold content
  – Right ingot—0.4%
  – Left ingot—less than 0.02%
• Conclusion
  – The left ingot is judged to be a modern forgery, perhaps 19th century

A Forgery with the “Correct” Gold Content

• Gold content is a guide to authenticity...
  – But it may not be conclusive
• An object with the correct composition
  – May be judged inauthentic
• The item may have been forged from ancient scrap silver

Example—Roman Silver Lamp Filler

• A Roman lamp filler
  – A common item in pottery or bronze but...
  – Rare in silver
• It was judged "probably not ancient"
  – On stylistic grounds
  – D.M. Baily of the British Museum

Silver Analysis

• Analysis of trace metals
  – Gold—0.5%
  – Copper—6.2%
  – Lead—0.5%
• All correct for Roman silver
• Conclusion—Probably a forgery made from ancient scrap
Silver in Pre-Columbian America

• Silver ore in Latin America
  – Widespread in the Mexican highlands and Western South America
• Thus, silver was mined and smelted
  – Long before the arrival of the conquerors

Moche Civilization

• Located on the north coast of Peru
• Flourished 0-700 CE
• A highly developed agricultural economy
  – Occupying river valleys along the coast

Moche Art

• Clay jars and bottles
  – In the form of heads
  – Showing facial features (portrait vessels)
• The metal workers were also very sophisticated
Moche “Genre” ceramics depicting scenes of everyday life, 200-500 CE
Moche Birth Ceramic, ca 250 CE

Ceramic vessel in the form of a woman washing her hair over a tub
Ceramic vessel: Recumbent anthropomorphic peanut playing a musical instrument (Quena, a type of Andean flute)

A Matched (?) Pair of Water Jars

Forgeries Are Inevitable

• Moche sculptures are striking and rare
  – One expects fakes to appear
• Example
  – A ceramic water jar (Gothenburg Ethnographic Museum)
  – Its provenance was impeccable
• It was clearly the model for a silver copy (Montreal Museum of Fine Arts)
  – Its provenance: “Found in a collection of Colonial Spanish silver many years ago by a Canadian who had been resident in Peru”

Analytical Evidence

• Analysis of the silver
  – It was too pure to be of the Moche period
• Conclusion
  – The silver jar was probably made by modern Peruvians
  – Modeled after the authentic ceramic jar

The Etruscan Terra-Cotta Warriors—The Metropolitan Museum of Art, New York

The Etruscans

• Etruria—north of Rome
• Inhabitants—Etruscans
  – Origin unknown
  – Flourished 800-200 BCE
  – Then absorbed into Roman Empire
• Herodotus
  – Mentions them
  – Assumed to have come from the East
Alphabet and Language

- Many inscriptions extant
  - Mostly on tombstones
  - Some on vases, statues, mirrors and jewelry
- Etruscan texts can be read
  - That is, the sound of the letters is known
  - But the decipherment is fragmentary
- The language appears to be non-Indo-European
  - A West Hittite dialect(?)
  - The Etruscan alphabet shares features with the Greek alphabet

Etruscan Life

- Independent cities
  - Ruled by an aristocracy and king
- Agriculture
  - Practiced irrigation
  - Built canals
- Famous as seaman and pirates
- Ceramic sculpture—extremely well developed
  - Large monumental statues used in worship
- Death and burial—a preoccupation
  - Complex burial grounds and...
  - Elaborate sarcophagi

Etruscan Monumental Statues

- Did gigantic clay statues of Jupiter and Heracles exist?
  - Pliny described them in a Roman temple
  - But none had been found
- Art historians were aware of the concept
  - A terracotta Apollo and a bronze warrior had been found
  - In the early 1900s, expectations were swirling
- The Etruscan city of Volsinii (modern Orvieto)
  - Yielded a large burial ground
  - Was this the site of Pliny's temple?

Apollo from the rooftop of the temple at Veii. c. 500 BCE

- Painted terra-cotta, height 5'10", Museo Nazionale di Villa Giulia, Rome

Etruscan Bronze Warrior

The Warrior was also a common theme in statuary

The Met is Approached—An Etruscan Terracotta Warrior has been uncovered

The Met's Agent and the Italian Dealer

- John Marshall (1862-1928) purchasing agent for the Met
  - From 1906 to 1928
  - Self-taught in antiquities
  - Responsible for many important acquisitions
- Pietro Stettiner, a Roman art dealer
  - Complicated connections in the Italian art world
  - Shady dealings(?)
A Terracotta Statue is Mentioned

- In 1915 Stettiner contacted Marshall
  - He had something spectacular
  - An terracotta Etruscan warrior (6'7½")
  - Uncovered at "Bocaporco" south of Orvieto
  - At the site of an Etruscan temple, formerly unknown
- Marshall wondered...
  - Pliny's statues at last?

The "Old Warrior" Torso

- Marshall wrote to the boss
  - Gisela Richter, assistant curator of classical art
- "I have arranged for the biggest T.C. you or any reasonable being ever saw."
- February, 1916
  - The "Old Warrior" arrived
  - In 20 pieces

"Old Warrior" assembled

- Right arm and part of right foot missing (and something else)

Gisela Richter Wrote to Marshall...

- "How the beautifully the painted patterns are preserved. Do you know anything of the provenance?"
- Oops!

Another Terracotta—The "Colossal Head"

- Another terracotta sculpture was purchased
  - Again from Stettiner and...
  - Shipped to New York
- On July 25, 1916, four large cases arrived
  - They contained terracotta fragments
  - 178 pieces in all
- This was the so-called "Colossal Head"
  - Reassembled and cemented by October

The Colossal Head in fragments (Rome)

- The head measures 4'7"
- A proportionately sized standing figure would be 23 feet tall
- Do we have here one of Pliny's "colossal gods"?

The Colossal Head reconstructed (New York)

- At this time WWI intervened
  - Little trans-Atlantic activity was possible
  - Terracotta activities ceased temporarily

The Third Terracotta

- It is now August, 1919, WWI is over
- The head of the Met, Edward Robinson, learns by telegraph that...
  - John Marshall has seen a new find, and he reports...
    - A fighting Mars 8¼ feet high
    - Wonderful preservation
    - Same artist as "big head"
    - Most important thing ever offered us
    - Price asked quite fantastic
The "Big Warrior" is acquired

- Negotiations dragged on
  - In 1921 Marshall took possession of
  - The "Big Warrior"
- This statue was in 78 fragments
- It was shipped to New York
  - and reassembled

"Publishing" the New Acquisitions

- "Publishing" an archaeological find...
  - Normally a cautious process
- The publication should include...
  - Details of the provenance
  - Opinions of art historians
  - A technical analysis of the work
  - And identifying photographs
- Obviously, thorough examination is required
- All studies to be completed before exhibition

The "Experts"

- Marshall—not educated in archaeology, but
  - Had studied all the Etruscan terracottas in Europe
- Richter was an outstanding authority on Etruscan art
- Charles F. Binns was the director of...
  - The New York State School of Clay Working and Ceramics
  - He was charged with the technical examination
  - He saw nothing wrong with the pieces
- But Binns noted...
  - The firing of large pieces would take several months
  - At continuously diminishing temperatures
  - To allow for slow cooling and avoid cracking
  - Great skill would be required to do this

Provenance of the Works

- Marshall undertook to verify...
  - The nature of the excavation site
  - Where exactly was Boccaporco?
- He repeatedly tried to visit the site
  - But on each occasion, the excavators were...
  - Sick, indisposed, or had some other excuse
  - He was frustrated
- Eleven years after the purchase of the first terracotta, Marshall still had not visited the excavation site
- Boccaporco could not be found on detailed maps of the region. Would such an excavation site show?

New Hands Take Control

- Two years later in 1928, Marshall died
- Three years later (1931), the director of the Met, Edward Robinson, also died
- Completion of the Met's new wing...
  - Containing an Etruscan room
  - Became the responsibility of Gisela Richter
- The provenance issue drifted away
The Works are Exhibited

- In February, 1933, the new wing of the Met opened
- The three big Etruscan pieces went on exhibition
- The MMA's *Bulletin* briefly described the pieces
  - But the report was preliminary
  - Not a "publication" of the pieces.
- Richter continued to work on her "publication"
  - But did not send it to press
  - She was waiting for complete agreement among the staff

"Old Warrior", "Big Warrior" and "Colossal Head" on exhibit in the new Etruscan Room
"Publication" is delayed

A Question Arises

- It is now 1936
  - The Etruscan terracottas on exhibit for three years
- Gisela Richter gets a curious letter
  - The writer is Professor Piero Tozzi
  - An art dealer in New York and Florence
  - He is writing from New York
  "If sometime you happen to be in this neighborhood, I would appreciate very much if you would come and see me…I have something to tell you."
- The name "Fioravanti" was written at the bottom of the page

Gisela Richter is Suspicious

- Richter wrote to Annie Rivier (April, 1936)
  - The deceased Marshall's secretary...
  - Who had continued to work for the Met
  "There is an absurd story going around that our t.c. dollies are modern and the work of Fioravanti…Find out who this Fioravanti is and what kind of things he makes…"
- Miss Rivier replied (May, 1936)
  Fioravanti "began work as a tailor, went on as a car driver; for some time had a small business in old furniture; went back to his cars; he has been for many years, and still is, a taxi driver in Rome. It does not sound much like an artist..."

"Publication" of the Etruscan Terracottas

- Her doubts were assuaged (or ignored)
- It was time to publish the "t.c. dollies"
- Gisela Richter in 1937
  - Curator of Greek and Roman Art at the MMA
  - She published in the MMA Papers series
  - A 33-page booklet in which
  - The three terracotta sculptures were fully described and illustrated with photographs
- Title "Etruscan Terracotta Warriors in the MM of Art"
  This was number six in the authoritative series of "Papers" published only rarely by the Met, an important and prestigious publication.

The Immediate Response

- The "Paper" was immediately acclaimed
  - In archaeology journals
  - The author was congratulated in
    Journal of Hellenic Studies, Latomus, American Journal of Archaeology, Berliner philologische Wochenschrift, Gnomon
- The publication was supported
  - In the United States, Germany, and Denmark
- She was clearly a respected authority in ancient art
Gisela Marie Augusta Richter (1882-1972)
- Born in London—both parents—art historians
- Education
  - University of Rome
  - University of Cambridge
  - Athens School of Archaeology
- The Met in 1906
  - Promoted to curator, 1910
- Published first book, 1915 *Greek, Etruscan, and Roman Bronzes*

**G.M.A. Richter, a distinguished career**
- Retired from the Met, 1948
- Continued actively studying and writing until her death in Rome in 1972
- In 1968, published her 36th (and last) book, *Korai—Archaic Greek Maidens*,
- One of the most influential people in classical art history of her time

**The Italian Dissent**
- Italian scholars disagreed
- The foremost Etruscologist of Europe, Massimo Pallottino...
  - Dismissed all three pieces as forgeries
- Giuseppe "Pico" Cellini, an art restorer and dealer...
  - Called the warriors stylistically incorrect
  - There was glass from Peroni beer bottles in the clay, he said
- Michelangelo Cagiano de Agevedo, Professor Greek and Roman Art at the University of Milan
  - Declined to examine the warriors during a visit to the MMA
  - He remarked,
    "How can I [look at them] when I [personally] know the man who made them."

**A Re-examination**
- Because of the controversy, the Met...
  - Ordered a complete technical re-examination of the terracottas
- The study would be headed by
  - Dietrich von Bothmer, curator of Greek and Roman art, and ...
  - Joseph V. Noble, administrative head of the Met

**The Findings**
- The glaze
  - The black glaze contained manganese
  - Manganese was not used in classical period ceramics
- The technique of firing
  - The pieces lacked vent holes
  - They could not have been fired in one piece
  - Why? They would have cracked
  - They must have been modeled, then broken into pieces and fired
  - This would only be done by forgers

**Thermoluminescent Dating**
- Thermoluminescent dating was not available in the 1930s
  - If it had been, the issue of the terracotta warriors...
  - Would have been quickly settled
  - TL became an available technique only in the 1970s
- In 1971, E.K. Ralph and M.C. Han, University of Pennsylvania
  - Measured the TL of the "Big Warrior"
  - Their study gave a date of 100 years BP
- Their conclusion—the “Big Warrior” could not have been fired earlier than 1850
Final Conclusion

• The T.C.’s were clearly not ancient
  – They had been glazed with non ancient materials
  – And fired in a way no Etruscan artist would have employed

Well, Who Made Them?

• Harold W. Parsons, an independent scholar
  – Had doubted the T.C.’s from the beginning
  – He heard the rumor about Fioravanti
  – Parsons tracked him down
• Fioravanti, now 78, confessed
  – He named his co-conspirators, now all dead
  – These were the Riccardi brothers

The Confession is Verified

• Parsons brought Alfredo Fioravanti to the American Consul in Rome
  – The forger wrote and signed a confession
• Von Bothmer came to Rome, interviewed Fioravanti
  – Fioravanti confirmed that the terracottas were fakes
  – Provided the details of the process
• Then, Fioravanti produced the missing thumb of the “Big Warrior”
  – It proved to be a perfect fit

The Met Announces the Fakes

• On February 13, 1961, the Met announced that the famed terracotta warriors were fakes
  
  The Metropolitan Museum of Art announced yesterday that, as a result of recently completed studies, its three "Etruscan" terracotta statues must be considered of doubtful authenticity. For some years there have been conflicting claims about these statues on stylistic grounds. Recently the staff of the Museum began a series of modern scientific and technical analyses. These developed convincing proof that these famous statues were not made in ancient times.
  
• A sensational announcement in the world of ancient art and museums

The Press Accounts


The Met Tells All

• In the “Papers” series, the Met confesses their error
  – All the data is given
  – Complete photographs presented
  – The role of Fioravanti is described

Where does the blame lie?

• Clearly Gisela Richter, otherwise a respected scholar, suspended her powers of judgment
• Why?
  – Fulfilled expectations—Pliny’s suggestions
  – A trusted source—John Marshall
  – Curatorial greed—a fabulous and unique acquisition
  – A crooked dealer—Pietro Stettiner fooled many people

What were the warning signs?

• Condition
  – Richter noted the "remarkable" preservation of the sculptures—a clear warning
  – She wrote in a letter, "How the beautifully the painted patterns are preserved..."
  – Too good to be true?
• Provenance
  – In the same letter, Richter wrote, "Do you know anything of the provenance?"
  – The honest answer, "We haven't a clue."
  – The source of the terracottas was never verified
  – The site of the excavation was never found

The Met, a Troubled Institution?
• Not really
  – The Met has an excellent reputation for exposing frauds
• An Art News editorial in 1961 said
  The Metropolitan, except for this strange sentimental obstinacy in the matter of the Etruscan statues, has an enviably clean record in seeking out the truth about its own possessions and then candidly publishing it.

The Etruscan Terra-Cotta Warriors
Who made them? How did they do it?

The Beginning
• It began in Cerveteri (Caere)
  – Had been a large city in Southern Etruria
• Here they found a necropolis in 1860
• In it were pieces of Etruscan sarcophagi

Restoration of the Sarcophagi
• Experienced restorers were called in
  – Pietro and Enrico Pinelli successfully completed the task
  – The restored sarcophagi were placed in museums
• The brothers now understood the potential of "restoration"
  – And a forgery enterprise was born
• Starting from new materials, they constructed...
  – A completely forged Etruscan sarcophagus
  – It was treated to simulate aged
  – And turned it over to dealers
• Domenico Fuschini and Alessandro Castellani were well known dealers
  – They were probably aware of the forgery
  – But they willingly sold the work to the British Museum

The Castellani Sarcophagus
• The sarcophagus arrived at the BM in pieces (1871)
  – Reassembled
  – Put on display in 1876.
• Compared to similar figures, quickly deemed false
• The figures are unprecedented
  – The man is nude—never seen
  – The woman's clothing is 19th century underwear and bears no relation to antiquity
• The final damnation
  – The inscription on the lid was a copy
  – Similar to one on a gold brooch in the Louvre
• In 1935, the BM acknowledged the likelihood of falsity
  – And took the sarcophagus off exhibition

Fuschini Sets Up a Studio
• The market for Etruscan fakes was ripe in the 1890s...
  – So, Fuschini persuaded Pio Riccardi, a craftsman
  – To set up a studio in Orvieto
  – And produce Etruscan funerary plaques
• These would supposedly come from a newly discovered Etruscan temple near Orvieto
  – Modeled on authentic plaques—Many museums were fooled
The Next Big Project
- Pio Riccardi died in 1912
- The "business" was passed on
  - To his son, Riccardo
  - And two cousins Teodoro and Virgilio
  - And a friend, Alfredo Fioravanti
- Next, an ambitious project
  - A larger-than-life size statue of an Etruscan warrior
  - What would become the Metropolitan's *Old Warrior*
    (The project was probably under the direction of the dealer, Stettiner)

How the Old Warrior Was Made Fioravanti Explained
- The *Old Warrior* stands 6 feet 7 ½ inches
  - It would have required an huge kiln
  - Ten feet high or more
- The Riccardi's largest kiln was 3x3x4 feet—Solution?
  - The warrior was completely molded, painted, and dried
  - Then broken into pieces
  - The pieces fired individually
- This of course would never have been done in antiquity

Solving Another Problem, Shrinkage
- Clay absorbs water during molding
- Firing clay drives the water out
  - This causes shrinkage
  - By as much as a third
  - Sometimes unevenly
- The Riccardis used a high proportion of sand and grog
  - (Grog is coarse gravel or broken pottery used as a filler)
  - Sand and grog don't absorb water and don't shrink on firing
- Thus, on firing, there was little distortion
  - The pieces fit back together reasonably well

The Model for the Old Warrior
- May have been the male figure on the sarcophagus in the British Museum
- If so, this would have been a forgery modeled on a forgery
- In any case, the Met bought it

"Big Head" is Conceived
- Pliny's description
  - An Etruscan temple containing gigantic figures
  - Jupiter and Hercules, each 25 feet high
- Riccardi and Fioravanti considered their next project
  - A 25 foot figure was beyond their capabilities
  - But they could create the **head** of such a figure
- What was their likely model?
  - A terracotta aryballos (perfume bottle)
  - In the shape of a helmeted Greek warrior
  - Just 2½ inches high
"Big Head" is Made

- As before, Riccardi and Fioravanti...
  - Molded, painted and dried it in one piece
  - Then broke it into fragments (178)
  - The fragments were fired, then checked for fit
- The purchase agent for the Met was Marshall, the dealer, Stettiner, as before
  - The crated fragments were shipped to New York
  - In New York, the head was reassembled
- What size statue would go with that head? It would have been 23 feet high!
  - Ample to fulfill Pliny's suggestion
  - Of course, it did not exist and never had

The "Big Warrior" is Created

- In 1918, "restorations" were interrupted
  - WWI was in progress—Riccardi and Fioravanti went into the army
- After the Armistice, the shop undertook its largest project—the "Big Warrior"
  - The model was a 5-inch bronze
    - Of a standing warrior
    - In the Old Museum in Berlin
  - The Riccardis had a photo of it

Construction of the "Big Warrior"

- The same techniques were used
- But an adjustment was required in mid-construction
  - The ceiling of the studio was too low
  - Changes in proportion had to be made
  - The result was a somewhat stocky appearance

Finished as Before

- The sculpture was molded whole
  - Painted, dried, then broken and fired in pieces
- As before, complicit dealers contacted the Met
- The Large Warrior became the third and last "Etruscan" acquisition produced by the Riccardi family.

The "Enterprise" Comes to an End

- While working on the Big Warrior...
  - Riccardo Riccardi, an enthusiastic horseman
  - Was thrown from a horse
  - And killed (1919)
- Fioravanti continued the project, but
  - The heart of the group was gone
- After "Big Warrior", no more Etruscan forgeries appeared

Fioravanti Tells All

- When confronted by Harold Parsons in 1960...
  - Alfredo Fioravanti, the surviving forger
    - Signed his confession in Rome
    - Before the American Consul
    - On January 5, 1961
  - He stated that he had helped make the warriors, and
    - That he still had the left thumb of Big Warrior, and
    - That he still had some of the unfired clay
  - The case is closed
The Mysterious Boccaporco

- The site of the "discoveries"
  - About five miles south of Orvieto
  - But not on maps
- Marshall tried to inspect the site
  - Of course, Ricardi and Fioravanti frustrated this effort
  - And why?
- Because there was no site at Boccaporco
- There was no Boccaporco
  [There is a tiny village called Boccaporco about 40 miles from Orvieto. It is not an excavation site.]

Johannes Vermeer and the Worlds Most Famous Forger

Vermeer's Chronology

- Born in Delft, 1632
- Married, 1653
- Local guild member, 1653
- Paints *The Procuress*, 1656
- Paints *Geographer*, ca 1669
- Borrows 1000 guilders from a merchant in Amsterdam, 1675
- Buried in Delft, 1675, age 43
  - His widow and eleven children are left impoverished
  - He completed perhaps 40 paintings, 36 known today

The Unknown Life of Vermeer

- There is no record of...
  - Who he studied with
  - Whether he took students
  - What his working methods were
  - What his domestic life was like
- Even his religion in not known
  - Born into a Protestant family
  - Married a Catholic women
  - Did he convert to Catholicism at that time?
- Vermeer left no self-portrait
  - Unlike Rembrandt who left some seventy

A Self-Portrait?

*The Procuress*, 1656
Art historians: The youth in the beret may be self portrait, based on stylistic similarities with Rembrandt’s self-portrait

A Successful Artist?

- A painter and an art dealer in Delft
- Painting output was small
  - Forty paintings(?)
- The output of Dutch painters in this period...
  - Usually hundreds—Rembrandt over 300
- In 1672, a severe economic downturn
  - Collapse of the art market
  - Vermeer suffered both as painter and as art dealer
- In 1675, Vermeer died suddenly at age 43
  - Due to financial pressures?
Vermeer's Painting Style

- Mostly domestic scenes
- Women doing everyday activities
  - Letter writing—Playing musical instruments—Lace making
- Often illuminated by daylight
  - From a window (not always visible)
  - The light comes from the left

Vermeer's Palette

1. White lead
2. Yellow ochre
3. Vermillion
4. Red madder
5. Green earth
6. Raw umber
   - Ivory black
   and Ultramarine

Vermeer and Ultramarine

- Vermeer prepared his own
  - By the classic method (extraction from lapis lazuli)
- The process was difficult, the stone rare
- Thus, ultramarine—the most costly pigment...
  - Was used sparingly by most artists—But often by Vermeer.

Examples—The Girl with a Wineglass

- Shadows in the red satin dress are underpainted with ultramarine giving them a subtle, slightly purplish cast

A Young Woman Seated at the Virginal

- Employed in the chair back, ultramarine was also used to produce the gray on the wall, giving a richer hue than one produced by a mixture of black and white

Incidentally...

A Young Woman Seated at the Virginal

- Up for auction July, 2004, at Sotheby's London
- The first time in 80 years a Vermeer was up for auction
  - Estimated sale price, $5 million—Generally considered low
- Actual sale price, $42 million

Vermeer, van Leeuwenhoek, and the Camera Obscura

What is a camera obscura?

- Basically, a pin-hole camera
  - A lens and a mirror
  - Projecting an image on a screen
- The viewer can see lighting and positioning precisely
- These are the effects Vermeer is best known for

Who was van Leeuwenhoek?

- Antonie van Leeuwenhoek (1632-1723)
  - A distinguished resident of Delft
  - Executor of Vermeer's estate (1675)
- A skilled lens-maker
  - Produced high quality microscopes
  - Known as the father of microbiology
- May have introduced Vermeer...
  - To the camera obscura
- Some art historians believe Vermeer...
  - Achieved light and perspective effects in this way

van Leeuwenhoek as Model?

- Is van Leeuwenhoek the man portrayed in
  - The Astronomer and The Geographer
Death and Obscurity

- After his death, Vermeer descended into obscurity
  - His output had been small
  - Little of his work had sold outside of Delft
  - And—the inevitable accidents of history
- For two hundred years, he remained unknown
  - Except to a few Dutch connoisseurs
- He was even omitted from surveys of Dutch art

Then—Rediscovery

- In 1842, Etienne J. Théophile Thoré...
  - A French scholar and collector
  - Studying Dutch art in the Hague
- Came upon Vermeer's *View of Delft*
  - His reaction...
    - Superb—Most unusual—Captures the attention—Powerfully impresses
- This is 167 years after Vermeer’s death

Thoré Publishes

- Thoré studied for 20 years more
- In 1866, published three articles
  - Defined and described Vermeer's work
  - Attributed 73 paintings to him
- Impact of Thoré's publication was enormous
  - Vermeer rapidly gained a reputation..
  - As one of the greatest Dutch artists of the 17th century
  - Demand for the few Vermeer's available was great

An Early Bargain

- *The Girl with a Pearl Earring*
  - Appeared at auction in 1882
  - Attributed to an unknown master
- A.A. des Tombe bought it for the equivalent of $200
  - He left it to the state in his will
  - Now in the Mauritshuis museum in The Hague

The Demand Soars

- By the 1900s, demand for Vermeers was high
  - American millionaires clamored for them
  - Every important museum wanted one
- There were large information gaps in Vermeer’s life
  - Thus, speculation on undiscovered works
  - Perhaps even undiscovered styles
- High prices were offered for an authentic Vermeer
  - Many misattributed or forged paintings appeared
  - Most were ultimately discredited
- Reliable authentication was needed

The Frick Collection New York

- Millionaire Henry Clay Frick bought three Vermeers for his personal collection
- Now housed in his New York home

High prices, forgeries, and misattributions in the Vermeer market demanded some correction. A critical eye was now needed to help the wealthy spend their painting dollars wisely
Enter Abraham Bredius (1855-1946)

- From a wealthy family
- An education dedicated to art
  - Studied in Italy
  - Traveled throughout Europe
- Published articles on art
- Established himself as a Vermeer expert in 1883
  - By attacking an attribution of Thoré’s in an article
  - “A Pseudo-Vermeer in the Berlin Gallery”
- Appointed director of the Mauritshuis in 1889, age 34

Bredius confirmed his "eye"

- By identifying several previously unattributed Vermeers
  - *Allegory of Faith* in 1899
  - *Christ in the House of Martha and Mary* in 1901
- A third “unusual” Vermeer in the grand style, and a more typical one
  - *Diana and Her Companions in 1901*
  - *Young Girl with a Flute in 1906*

Bredius Leaves the Mauritshuis

- In 1909, Bredius left the Museum
  - Citing health concerns
- Traveled, studied, and wrote
- In 1922, settled in Monaco
  - Continued as an active art historian and critic
  - And maintained his standing as a Vermeer expert
- And the world wide hunger for Vermeers persisted

Forward to 1932

- Bredius is now 77
- In this year, Bredius published an article in Burlington Magazine
  - He tells of the many fake Vermeers he has seen
  - But now, he is happy to announce that he has seen...
    - “…a very beautiful authentic Vermeer which has recently been discovered.”
- The painting was quickly purchased by an Amsterdam banker
  - Who placed it in his private collection

The New Vermeer—*Lady and Gentleman at a Spinet*

Was the new Vermeer authentic?

It shared characteristics with two known Vermeers

Passive Rejection

- Bredius's evaluation was not accepted
  - Critics: "An obvious pastiche"
  - Though none dared challenge him openly
- Rather than openly oppose Bredius...
  - His attribution was quietly ignored
  - The *Spatinet* was not included among the accepted Vermeers
- Bredius's authority on Vermeer was weakened
  - He was now considered negligible in some circles
  - But outside of Holland his name was still important
Bredius is not finished!—Forward to 1937

- Bredius is now 82 and nearly blind
  - A respected Dutch politician, G.A. Boone
  - Approached Bredius in Monaco
- He had a painting—The Supper at Emmaus
  - And a story...
  - Would Bredius give his opinion?

Bredius Loved It!

- He published his reaction in The Burlington Magazine (November, 1937)
- A New Vermeer
  …We have here “a”—I am inclined to say— “the” masterpiece of Johannes Vermeer of Delft…quite different from all his other paintings and yet every inch a Vermeer.

Was this Vermeer authentic?

Wasn’t it in the same vein as Christ in the House of Martha and Mary previously authenticated by Bredius?

The Supper at Emmaus goes to a museum

- The director of Rotterdam's Boijmans Museum, Dirk Hannema
  - Learned of the new Vermeer
- On the advice of Bredius, Emmaus was purchased
  - The price was 540,000 guilders
  - About 5.6 million 2010 dollars

A Great Acquisition

- Emmaus was proudly and prominently displayed at the museum
- The Supper at Emmaus drew huge crowds—“people stood in silent reverence before this painting”
  - And there it remained, revered, for seven years

Vermeers Continue to Emerge

- From 1939 to 1943 five more Vermeers appeared
  - All in the same "religious" style as Emmaus
  - When compared with Emmaus...
  - Their authenticity seemed apparent
- Four went to collectors, one to the Dutch state
- All fetched handsome prices
- Their titles and the year sold are
  - Head of Christ 1941
  - Last Supper 1941
  - Isaac Blessing Jacob 1942
  - Christ and the Adulteress 1942
  - The Washing of Christ's Feet 1943

What we found out later...

- The five war-time "Vermeers“
  - Were all the work of the forger, Han van Meegeren
- He admitted the forgeries
  - To avoid the more serious charge of "collaborator“
- He had sold a "national treasure" to the Germans
  - That is, to Hermann Göring.
Han van Meegeren—The Story of the Forger

Early Years
- Born 1889 in the Dutch town of Deventer
- Loved drawing as a child
  - Pursued it despite his father’s disapproval
  - Sometimes spending all his pocket money on supplies
- He compromised with his father...
  - Studied architecture

He Wins a Prize
- In 1911, he married Anna de Voogt
- He won first prize from the Delft Institute of Technology...
  - For a drawing of a church interior
- He agreed to sell the drawing, but...
  - He was discovered by his wife making a copy
  - She dissuaded him from selling it as the original
- This is the first instance of his interest in fakery
  - Even if he was forging his own work

Begins his Art Career
- Moved to The Hague
  - Received his art degree 1914
- Supported himself...
  - Selling his work
  - Giving drawing lessons
  - Work fairly well received
- In 1923 he divorced Anna
- In 1929, he married Johanna Oerlemans

His Artistic Style
- Conservative and sentimental
- And reasonably successful

Examples of van Meegeren’s Art
- A Jolly Party (1927)
- Nachtlokaal (Night Club), 1924—The scene reflects van Meegeren’s risqué sensibilities
- Woman in front of a Mirror
  - Pastel sketch probably done quickly at the party
- The Dancing Sailor—Mildly pornographic paintings like this made lots of money for van Meegeren

A Famous Image
- In 1921, van Meegeren painted The Fawn
  - It became very popular on calendars and postcards
  - And was known as Princess Juliana’s Deer

van Meegeren and the Art Scene
- A talented artist
- But out of step
  - With the 1920's art scene
- Art was being revolutionized
- van Meegeren was the rear guard
  - Opposed to all modernist tendencies in art
- Critics treated him condescendingly and harshly
- His response: a “slimy little group of woman-haters and negro-lovers”
What were other artists doing at this time?

White Cross, Vasily Kandinsky, 1922
Red Balloon, Paul Klee, 1922
Tableau 2, Piet Mondrian, 1922
The Tilled Field, Joan Miró, 1924
Mandolin and Guitar, Pablo Picasso, 1924

The Future for Han?

• No future in the contemporary art scene
• Needed—A new direction for his considerable talents

Van Meegeren Turns to Forgery

• In 1923, van Meegeren...
  – Produced his first forgery
  – The Laughing Cavalier
  – Presented as the work of Frans Hals
• Hofstede de Groot authenticated it
  – And it sold profitably at auction
• But scientific examination soon exposed it as an obvious fake
  – van Meegeren had made blunders in his pigment use

Van Meegeren’s Blunders

• Frans Hals had died in 1666, but van Meegeren had used...
  – Zinc white (1780) in the collar
  – Cobalt blue (1802) in the background
  – Synthetic ultramarine (1828) in the coat
• Van Meegeren’s role in The Laughing Cavalier was not uncovered at the time
  – But he learned the lesson of anachronistic pigments

Van Meegeren’s First Vermeer

• In 1932 Van Meegeren produced his first “Vermeer”
  Lady and Gentleman at the Spinet
  – Praised by Abraham Bredius...
  – As a fine Vermeer
• Other critics rejected Bredius’s evaluation
• The painting was ignored as an obvious pastiche
  – Another lesson for van Meegeren

Van Meegeren Continues his Education

• In 1932, van Meegeren moved to Monaco
  – Supported himself by painting portraits
• But really, he educated himself in the technique of forging old masters
  – Studied 17th century pigments
  – Learned how to “age” a painting
  – Learned to use resins to resist solvents
  – Devised a method for producing “craquelure”

Craquelure on the Mona Lisa

• “Craquelure” is the fine pattern of cracks formed on paintings as they age
• Because it is hard to imitate, it is sometimes used to detect a forgery
• Van Meegeren was well aware of this property
He Chooses his Subject Carefully
• His first “Vermeer” had been rejected as a pastiche
  – A new subject was required
• What influences made sense
  – Bredius had said: Other “religious” Vermeers should exist
  – Other art historians suggested: Vermeer might have traveled in Italy
• Van Meegeren fulfilled these expectations exactly
  – A religious scene with a touch of Caravaggio

The Supper at Emmaus
  Caravaggio, 1606 model for Vermeer (?), undated
  The title is the same. The composition is similar.

The “Provenance” of Emmaus
• van Meegeren made it up
  – A Dutch family living in Italy
  – Had owned the painting for generations
  – Their identity a secret because of the fascists
• van Meegeren sent it to a dealer
  – Shown to Bredius—it fulfilled his prediction
• Sold it to the Boijmans Museum
  – After pay-offs, van Meegeren received about two-thirds of the sale price (ca $5.5 million today)

Not Everybody Was Convinced
• The local agent of Duveen Brothers
  – Called it a “rotten fake”
• But typical for the art world...
  – Critical judgments of this type...
  – Are not publicized

The Money Rolls In
• From 1939 to 1943, van Meegeren produced...
  – Five more “Vermeers”
  – In the religious style of Emmaus
• Respectable dealers compared them to Emmaus
  – They looked OK
• Four went to collectors, one to the state

The Money Rolls In (continued)

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<th>PAINTING</th>
<th>YEAR SOLD</th>
<th>PRICE (GUILDERS)</th>
<th>PRICE (1940 DOLLARS)</th>
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<tr>
<td>Christ at Emmaus</td>
<td>1937</td>
<td>520,000</td>
<td>$300,000</td>
<td>5,000,000</td>
<td>Boymans Museum</td>
</tr>
<tr>
<td>Head of Christ</td>
<td>1941</td>
<td>475,000</td>
<td>$225,000</td>
<td>3,700,000</td>
<td>van Beuningen</td>
</tr>
<tr>
<td>The Last Supper</td>
<td>1941</td>
<td>1,600,000</td>
<td>$600,000</td>
<td>10,000,000</td>
<td>van Beuningen</td>
</tr>
<tr>
<td>Isaac Blessing Jacob</td>
<td>1942</td>
<td>1,270,000</td>
<td>$500,000</td>
<td>8,320,000</td>
<td>van der Vorm</td>
</tr>
<tr>
<td>Christ and Adulteress</td>
<td>1942</td>
<td>1,650,000</td>
<td>$624,000</td>
<td>10,000,000</td>
<td>Marshal Goering</td>
</tr>
<tr>
<td>Washing of Christ Feet</td>
<td>1943</td>
<td>1,300,000</td>
<td>$500,000</td>
<td>8,320,000</td>
<td>Dutch Gov't</td>
</tr>
</tbody>
</table>

van Meegeren Prospers
• Van Meegeren was now very wealthy
  – Living luxuriously
  – Throwing lavish parties
• He used alcohol and drugs heavily
– Becoming a morphine addict.
– Occupying a villa in Monaco

Now there occurred a curious chain of events

• Hermann Göring
  – The Nazi Reichsmarschall
  – An aggressive art collector
• In 1944, he purchased *Christ and the Adulteress*
  – Through intermediaries, and...
  – Shipped it to his estate at Carinhall in Germany
• In 1945, Göring was arrested
  – His possessions confiscated

The “Vermeer” is recovered

• Göring had given the painting to his wife’s nurse
  – For her future security
• Army staff obtained it
  – And exhibited it
• The New York Times trumpeted the recovery

The Connection is Made

• A “Vermeer” had been sold to the Nazis
  – van Meegeren was connected with the sale
• van Meegeren was arrested on May 29, 1945
• The charge
  – He had sold a national treasure to the enemy
  – This was collaboration—a capital crime
• He was immediately imprisoned
  – Alcoholism and drug addiction made prison difficult
  – The threat of death didn’t help

The Way Out—Confess Everything

• To avoid conviction for collaboration
  – He confessed to forgery, a lesser crime
  – In fact, he said, he had forged five “Vermeers”
• This claim was met with disbelief
• A scientific commission was set up to investigate

van Meegeren— "I’ll Prove It"

• van Meegeren made a proposal
  – Give me paints and canvas and...
  – I’ll paint a new “Vermeer” in jail
• The painting was completed
  – *The Young Christ Teaching in the Temple*
  – Clearly by the same hand
• The charge of collaboration was dropped
  – He would be tried for forgery

The Trial

• The trial finally began in October of 1947
• It was an international sensation with the courtroom looking like an art gallery

His Defense

• I didn’t do it for the money
  – I only love to paint
• My career was ruined by malicious critics
The Tide Turns in his Favor
- He became a folk hero
  - The man who had make fools of many eminent scholars and curators
- He was the brilliant forger
  - Who duped the critics and the Nazis
  - And showed how empty the critical “eye” was
- He was a kind of a Robin Hood...
  - Who kept the profits

He Gets Off Easy
- He pleaded guilty to forgery
- The State demanded the maximum—two years
- The court gave him the minimum—one year
- And, everything he owned
  - Houses, art, jewels, and cash
  - All confiscated for distribution to those he had bilked

He Avoids Prison
- Van Meegeren’s alcoholism and drug abuse intervened
  - On November 26, 1947, he had a heart attack, then, a second one
  - He died December 30, 1947, at the age of 58, in Amsterdam
- He didn’t serve a day of his sentence

How did he get away with it?
- He used authentic materials
  - Correct paints and old canvases
- It was wartime
  - Travel was difficult
  - Families had fallen on hard times
- There was confusion in the art market
  - The presence of looted Jewish collections
- He chose the perfect subject
  - Its existence had been predicted

The Perfect Storm of Forgery!
- The greatest forgery of art works in modern times
  (until the Knödler Scandal?)
- It resulted from—Finesse, research, expectations, and circumstances
- It was uncovered by a curious happenstance
  - Göring wanted a Vermeer
  - Had heard of one (a van Meegeren)
  - Demanded that it be sold to him
- Its recovery required van Meegeren to confess to forgery
  - If he had not confessed, who knows?

Could it happen again?
- Probably not. Why?
- Advances in science since the 1940s
  - Analysis of radioactive isotopes in lead...
  - Now gives the date when the lead was smelted
- Genuine lead white is not enough
  - It must be lead white made at the time in question
To forge a Vermeer, lead white made in 1600 must be used

• Impossible? Virtually… Easier to forge a Pollack

**Testing Lead for Age**

• In lead ore, two of the radioactive trace elements are
  – Ra-226 and Po-210
  – Their concentrations are roughly equal in the ore
  – So their ratio is approximately 1.0
• When lead ore is refined, the Ra-226 is removed
  – Now the ratio of Ra-226 to Po-210 is small
  – The range is 0.02 to 0.10
• Over time, radioactive decay rebuilds the Ra-226
  – After 200 years, Ra-226 and Po-210 are again equal
  – The ratio is again near one

**When was the lead refined?**

• As before in studies of isotopes, Mass Spectrometry is used
• Recently refined lead or modern lead
  – The Ra/Po ratio is 0.1/2.0
  – 0.1 ÷ 2.0 = 0.05, that is, close to zero
• 17th century lead
  – The Ra/Po ratio is 1.4/1.5
  – 1.4 ÷ 1.5 = 0.93, that is close to one
• A reliable way to get the date of lead refining—should be near the date of lead white manufacture

**Vermeer and van Meegeren**

• So, Ra/Po is ~0 for new lead and
  Ra/Po is ~1 for old lead
• Then
  1-Ra/Po ≈ 1-0 = 1 for new lead
  1-Ra/Po ≈ 1-1 = 0 for old lead
• For van Meegeren’s *Emmaus*
  – 1-(Ra)/(Po) = 0.91
  – Indicates new lead
• For Vermeer’s *The Lacemaker*
  – 1-(Ra)/(Po) = 0.07
  – Indicates old lead

**Lead White Dating**

• The value of the term 1-(Ra)/(Po) must agree with the date
• A painting dated before 1820
  – Must have 1-(Ra)/(Po) below 0.2
• A painting dated after 1880
  – Must have 1-(Ra)/(Po) near 1.0
• The region from 1830 to 1880
  – Cannot be reliably dated by this method

**Conclusion**

A modern Vermeer forgery can now be reliably exposed
Caution: An 1820 forgery of a 1620 painting might not be detected by this method
The Shroud of Turin

What is the Shroud of Turin?

• A length of linen
  – 14 feet 3 inches long
  – 3 feet 7 inches wide
• It contains two faint brownish images
  – The back and front of a man can be perceived
  – Six feet to six feet one inch in height
• As if a body had been sandwiched
  – Between the layers
• There are markings on the cloth
  – The stigmata of Jesus (?)
  – The blood of Jesus (?)

Descent from the Cross Giulio Clovio, ca.1540
The shroud and its manner of folding are shown
The image—once distinctive is now faded

History of the Shroud

• In 1354, first mention
  – It is in the possession of a knight
  – Geoffroy de Charny, Lord of Lirey
  – It is a small town near Troyes
  – 90 miles southeast of Paris
• No one ever explained
  – How the shroud was acquired
• The Charny family retained possession of the shroud
  – Until 1453

Geoffroy de Charny Lord of Lirey

• In 1356, Sir Geoffroy was killed
  – In the Battle of Poitiers
  – A battle in the Hundred Years War
• The shroud passed to his heirs

The Shroud is Exhibited

• In 1357, the shroud was placed on view
  – By the canons of Lirey
  – As the "true Burial Sheet of Christ"
• Crowds of pilgrims came
  – Medallions were struck
  – In commemoration of the event.

A Medallion Survives

• One such medallion has survived
• It is an authentic record of the shroud
  – Its date is uncertain
  – 1357(?), the date of the first exposition
• It was discovered by Arthur Forgeais (1865)
– He often recovered objects from the Seine
– This is his drawing

• Today, the medallion is in the Musée de Cluny in Paris

**The Pilgrim’s Medallion (1¾ by 2½ inches)**

• This extraordinary object
  – Depicts the shroud
  – The coat of arms of Geoffroy de Charny
  – And that of his wife, Jeanne de Vergy

**The Shroud—Authentic?**

• The Canons of Lirey had declared the shroud...
  – The "True Burial Sheet of Christ"
• The Bishop of Troyes investigated
  – An important question
  – Praying to an inauthentic relic might endanger souls
• Bishop Pierre d'Arcis reported to the Pope (1389)

**The Bishop's Report**

• The shroud is not authentic—Why?
  – No provenance—origin unknown
  – The gospels do not mention an image on Christ's shroud
  – It was not possible that such an image would have been overlooked until now (1389)
• And most important
  – A forger had confessed and described how he had painted the shroud

**The Pope Decides**

• Pope Clement VII ruled, in 1390
  – The cloth of Lirey was a painted cloth
  – Not the shroud of Christ
• The cloth could be exhibited publicly but...
  – All ceremonies must be omitted
  – No candles, no incense, no guard of honor
• When exhibited, the following must be stated
  "It is not the True Shroud of Our Lord"

**A Valuable Relic**

• Officially declared inauthentic
• But still taken to various cities throughout France where...
  – It was exhibited, admired, and prayed before
• The exhibiting of such relics was very lucrative
  – The shroud was highly valued intrinsically
  – And as a source of income to its owner

**A Change of Ownership**

• In 1453, the de Charny family sold the shroud
  – To Duke Louis I of Savoy
  – The Duke moved the shroud
  – To a newly built Sainte Chapelle at Chambéry
• In 1532, there was a fire at the Sainte Chapelle
  – Some scorching and water damage to the shroud
  – Repaired by the Poor Clare nuns
• In 1578, the shroud was brought to Turin
  – The new capitol of the House of Savoy

**Travels of the Shroud**

• 1354—Lirey
The Shroud Arrives in Turin
- In 1694, the shroud was placed in the Turin Cathedral
  - In a specially designed chapel
- It has remained in Turin until the present day

Current Ownership
- The Savoy family bequeaths the shroud
  - On the death of Umberto II
  - The shroud was left to the Pope
  - And his successors (1986)
- Public exhibitions are infrequent

The Exhibition of 1898
- An exhibition of the shroud was publicized in 1898
- Secondo Pia, a lawyer in Turin...
  - Well known as a photographer
  - Was allowed to photograph the shroud
- Upon development of the negatives...
  - Secondo was struck by the resulting images
  - Interest in the shroud was renewed

"Scientific" Examination
- Scientific examinations were allowed
  - In 1969, 1973, and again in 1978
- What caused the images?
  - Paints (or other pigments), scorches, or other agents
- The tests were not rigorously conducted
  - The results were inconclusive
- What about radiocarbon dating?
  - In the 1970s, the sample would have to be large
  - A piece 8 by 10 inches would be required—This was an unacceptable

Finally, Radiocarbon Dating
- The development of Accelerator Mass Spectrometry dating after 1977
  - Sample size was reduced
  - Roughly one square inch would work
- In 1988, the Vatican authorized the analysis
  - Three laboratories were selected
  - AMS labs in Arizona, Oxford, and Zurich
- Extreme care in removing and transporting the samples was observed, April, 1988
- The results were reported in October, 1988

Radiocarbon Date of the Shroud
- In October, 1988, the results were announced
- All three laboratories agreed
- The RC dates of the shroud were between 1260 and 1390 CE
- This date agreed with the first known mention of the shroud—1354

The Vatican Response (1988)
- TURIN, Italy, Oct. 13 (NYT)— The Roman Catholic Church announced today that the Shroud of Turin could not be authentic
- Based on scientific tests which show...
The linen dates from the Middle Ages

- Catholics were encouraged to continue their veneration of the shroud as a pictorial image of Christ, still capable of performing miracles.

**Case Closed?**

- Hardly
- There has been a deluge of criticisms...
  - Of the methodology of the C-14 dating
  - Of the unrepresentative nature of the sample
  - Of the prior handling of the shroud
  - Etc., etc., etc
- Fanaticism dies hard
- But, no rational objections have been raised
  - In the face of the extreme care used in the sampling and dating
- And no further testing has been allowed

**A Scientist Speaks**

- Victor Tryon
  - Director of DNA Research, U. of Texas
  - Performed DNA tests on the shroud (1990)
  - Then, immediately quit the project
- His reason for quitting?
  "It was my first encounter with zealotry in science."

**The Church Position Remains...**

- The shroud is not authentic, but...
- Christians are encouraged...
  - To continue to venerate the shroud
  - As an inspiring image of Christ
  - The Pope sets the example by praying before the shroud
- The shroud was exhibited in 1998, 2000 and 2010, this last being the 18th time in its modern history

**The Getty Kouros**

- In this case, the three pillars of authentification
  - Connoisseurship, Provenance, Scientific verification
- Are all in a muddle

**The Greek Kouros**

- Kouros (pl kouroi)
  - Statue of a male youth
  - Usually in marble
  - Found throughout the Greek world
  - Particularly in the Southern Aegean
  - Larger than life-size (6'4" to 6'10")
  - Produced ca 620 to 480 BCE
- Over 200 exist in fragments
  - Only 13 complete

**The Kouros—The Meaning**

- Purpose is unclear—were they...
  - Representations of Apollo
Commemoratives of the dead
Memorials for victorious athletes
Symbols of sexual gratification

**Pose of Kouros**

- Frontal pose with no torsion of the body
  - Always nude
  - Head erect, eyes front
  - Waist narrow
  - Inner thighs touching
  - Muscles weakly delineated
- Left foot advanced
- Arms hanging at sides
  - Fingers curved, thumb foremost
- A faint smile—the "archaic smile"

**Egyptian Connection(?)**

- Style and posture
  - Drawn from Egyptian sculpture (?)
- The Greeks and the Egyptians
  - Traded extensively
  - Before 600 BCE

**The Getty**

- The Getty Trust was established 1953
  - By John Paul Getty, an oil millionaire
- Getty died in 1976
  - The bulk of his estate was left to the trust
- Now the world's wealthiest art institution
  - Endowment, $4.2 billion (2009)
  - Six times the endowment of the MMA
- Two locations
  - The Getty Center in Los Angeles (Brentwood)
  - The Getty Villa in Malibu
- Its acquisition budget is not published
  - Guesses—Up to $80 million per year

**The Getty Museum Complex, Brentwood**

- Architect of the structure—Richard Meier
- Designer of the gardens—Robert Irwin

**The Getty Villa, Malibu**

Modeled after the Villa dei Papiri, Herculaneum, Italy; buried in the eruption of Vesuvius, 79 CE; first excavated in 1750

**The Getty Seeks**

- The Getty had big bucks for acquisitions
- But acquisitions were not easy
  - Most great works are owned by museums—they don't sell
  - Foreign governments restrict exports
  - The trade in looted objects has virtually dried up
- The Getty paid huge amounts
  - But their collection grew slowly
  - And they have had to return questionably acquired objects

"If you can actually count your money, then you are not really a rich man."

- J. Paul Getty
• Plus, their staff has been disrupted by leadership changes
• A recent purchase...
  – A Turner

The Getty Flexes its Muscles

*Modern Rome - Campo Vaccino* J.M.W. Turner (1839)
• Bought by the Getty Museum at Sotheby’s, July, 2010
  – Price, $44.9 million
  – A record for Turner at auction
• Previous high was $35.9 million
  – For *Giudecca, La Donna della Salute and San Giorgio*
  – April 2006 at Christie’s in New York
• *ArtNews* asked
  "Does this signal a return to the megabucks acquisitions that the Getty used to be famous for, back in the days when "The Getty Factor" roiled the art market?"

The Getty Kouros

• The Getty—eager to have a kouros
  – Generally known in the antiquities world
• In 1983, a Swiss dealer offered one
  – To the Getty's curator of antiquities, Jiří Frel
• Frel brought the work to Malibu
  – For examination
• It was in seven pieces
  – With minor damage
  – But it was complete

The Initial Evaluation

• A wonderful sculpture
• But there were problems
  – It seemed to be a pastiche of styles
  – Making it difficult to date
  – And to trace to a specific location
• The surface was not typical of known kouroi
  – It was chalky and tea-colored
• Closer examination was obviously required
  – The trustees of the Getty authorized a series of tests

Science

• To identify the marble...
  – X-ray diffraction was carried out
  – By Norman Herz, an authority in the field
  – Results: 88% dolomite and 12% calcite
• To identify the quarry
  – Isotopic analysis was carried out
  – Results: $\delta^{18}O = -2.37$ and $\delta^{13}C = +2.88$
• There were several possible sources
  – Doliana, Marmara, Aphrodisias, or Thasos-Acropolis.

The Best Fit

• Two more factors
  – Trace element analysis and
  – The high dolomite content
• The likeliest source, Thasos
• However, a Thasian Kouros would be unusual
  – It is possible that others exist
  – But no other kouroi of this stone has been identified

**Where are we to this point?**

• Stylistically, it seems to be a pastiche
• The marble presents problems
  – The surface is unusual
  – It's origin is Thasos
  – No extant kouroi have been found with this marble content
• Where do we go from here?

**More Science**

• Enter Stanley Margolis
  – U. C. Davis, Professor of Geology
• His findings (1984)
  – The marble was dolomite (calcium magnesium carbonate)
  – The surface had undergone de-dolomitization
• De-dolomitization
  – The magnesium is leached out
  – Leaving a crust of calcite (calcium carbonate)
• Professor Margolis further announced that...
  – This process required many centuries
  – It could not be duplicated by a forger

**The Getty Board Decides**

• The Getty board bought the kouros
  – Based on Margolis's findings
  – And the reasonable provenance
• The price (1985) was about $9 million
  – But not revealed at the time
• Note—there was a strong dissenter on the board
  – Federico Zeri, a respected Italian art historian, resigned in protest

**The Provenance**

• The work was traced back to a Swiss physician
  – Jean Lauffenberger
  – He had purportedly bought it
  – From a Greek dealer in 1930
• Photocopies of three letters to Lauffenberger verified the authenticity
  – Ernst Langlotz, an eminent German scholar, in a letter dated 1952...
    • Related the style to a kouros in the Athens museum
  – A second letter, dated 1952, confirmed Langlotz's opinion
  – A third letter, dated 1955, commented on repairs to the kouros
• These dates seemed to confirm the story of the purchase

**It's Time to Display**

• The provenance—apparently settled
• The marble composition—established
• The Getty staff was now satisfied
  – The kouros was authentic
• In October, 1986, the reassembled kouros...
Was put on display

An article in the NYT described it as
"one of the most important works of art to have entered the United States since World War II"

But Now, Three Questions Arise

Question 1
Had Jiří Frel faked the provenance?

Question 2
An obviously fake kouros torso was later found
Was it related to the Getty kouros?

Question 3
The surface of the kouros "could not have been faked"
Really?

Some Questions about Jiří Frel

For the mercurial Jiří Frel...
Working with the Getty Board was difficult
They often refused to buy something he recommended
Because it was too inexpensive and...
Not worthy of the Getty
"Get the greatest and rarest objects" was the stated goal
He had to figure out...
How to acquire objects without the board's approval

Jiří Frel's Plan

Donated objects did not need board action
So, Frel devised a scheme
He convinced collectors to donate works to the Getty
In exchange, Frel greatly overvalued these donations
The donor then could claim a large tax deduction
Clearly a great tax advantage for the donors
But a violation of Getty policies
Had he also faked provenances for other objects?
To cover up looted or stolen antiquities?
Possibly
Frel, who had championed the kouros...
Was forced to leave the Getty in 1985

The Kouros's Provenance(?)

Because of Frel's transgressions...
The kouros documents had to be re-examined
The provenance was based on three letters
All to the Swiss physician
Lauffenberger, the prior owner
But only photocopies existed
The originals had "disappeared"
An expert in German document analysis was hired

The Provenance Re-examined

The document examiner's conclusion
The letters were fakes
The evidence
The 1955 letter referred to a bank account not opened until 1963
The 1952 letter contained a postal code that did not exist until 1972
The signature of Langlotz was forged
• Thus, there was no history of the kouros prior to 1983
  – The year it was offered for sale to the Getty
• In effect, there was no provenance!

**Question 2: The Fake Kouros Torso**
• In April, 1990, Jeffrey Spier, a scholar based in London
  – Saw a photo of the torso of a kouros located in Basel
  – This kouros was smaller
  – Inferior in quality
  – An obvious forgery
• But, stylistically, it was very similar to the Getty kouro
• If they had been made by the same hand
  – The Getty kouros would be deemed a forgery
• Spier contacted Marion True
  – She was now curator of antiquities at the Getty
• They met in Switzerland to examine the second kouros

**Comparison**
• The stylistic similarities(?)
  – Sloping shoulders and upper arms
  – Volume of chest
  – Rendering of the hands and genitals
• The marble
  – Both marble samples are from Thasos
• Technique
  – The sculpting techniques are different
  – Power tools were apparently used on the torso
• Relationship
  – A practice run by forgers(?)

**Question 3: The Surface**
• The prior findings and assertions (Stanley Margolis, 1984)
  – The marble was dolomite
  – The dolomite surface had been de-dolomitized (converted to calcite)
  – The process required centuries and could not be forged
• These findings are revised (1993)
  – The surface was not calcite (calcium carbonate)
  – It was whewellite (calcium oxalate monohydrate)

**Question 3 (cont)**
• An oxalate layer might be easily created
  – By application of oxalic acid
  – A chemical often used to clean marble surfaces
• Norbert Baer, professor of conservation at NYU summarized:
  "It is difficult to understand how X-ray diffraction data identified calcium oxalate as calcium carbonate [except as a result of gross incompetence]."

**Bye, Bye, Kouros**
• The kouros is removed from exhibition
• On July 6, 1990, the Getty announced that the kouros was to be removed from exhibition
  "in order to make new scientific and stylistic analyses."
The Conference of 1992 in Athens

- The controversy surrounding the authentication went on, so...
- A conference was convened
  - Could a consensus be arrived at?
- Nineteen specialists attended
  - The Getty paid for everything
- The kouros was shipped to Athens
  - Where it was prodded, poked, and examined by all
- The main event was the presentation of talks by each attendee
  - Containing opinions, judgments and facts

The Conference Summary

- The talks were summarized in *The Getty Kouros Colloquium*
  - Each participant gave his/her view of the statue in 2-3 pages
- Estimates of the opinions varied
  - C. Chippendale (Cambridge)—Genuine 7, fake 6, undecided 3
  - Thomas Hoving—"Vast majority believe it to be phony"
  - Yours truly—Genuine 3, fake 4, undecided 12

A Professor of Archaeology Reacts

- Ricardo Elia, Department of Archaeology, Boston University
  "The colloquium resolved nothing"
  - Art historians could not agree
  - Scientific testing could not determine if the kouros was genuine or a fake
  - One doesn't need millions of dollars and a conference
  - Just apply the smell test
  - Everything about the Getty kouros case stinks

The Getty Caves

- Frank Preusser, Associate Director of the Getty Conservation Institute, says
  "The scientific studies have not provided any proof of the authenticity, and most likely never will…"
- The Getty's label on the kouros exhibit now reads
  "Greek, about 530 B.C., or modern forgery"

Well, who made the Getty kouros and when?
An unanswered question.

The forged torso obtained by the Getty was subsequently augmented with the head and thighs.

Guesses...

- The torso is the best clue
  - Many stylistic similarities to the kouros
  - Also made of marble from Thasos
  - But, power tools were used
- Speculative
  - The torso was made in Rome, 1984-5
  - The sculptor was Fernando Onore
Was the torso a first trial?

Dick and the Kouros

The Enigma of the Getty Kouros

• Why was there so much confusion?
• Why was it difficult to authenticate?
• Why was the science so confused?
• Why was the art world so annoyed?

My Conclusion

• Money is a magnet for chicanery
• Money can't buy competence
• Money can't buy happiness
• Money is the root of all evil
• Money makes the world go around

The Knoedler Scandal

The Knoedler Gallery

• Oldest commercial gallery in the U.S.
  – Founded in 1846 (before the Met)
  – In operation for 165 years
• Over the years, eight different locations in Manhattan
  – Starting on Broadway
  – Ending up at an Italian Renaissance-style town house in 1970
    • 19 East 70th Street in 1970

Knoedler helped shape the tastes as well as decorate the homes of wealthy Americans

Knoedler's President

• Ann Freedman
  – Earned a BFA in painting
  – Washington U (St. Louis)
• Began her art career in 1971
  – Receptionist for a NY gallery
  – Came to the Knoedler in 1977
  – Co-director in 1979
  – President in 1994
• Resigned abruptly in 2009
  – Amid rumors of a brewing forgery scandal

The Beginning of the Scandal (1994)

• Glafira Rosales
  – Owner of a small art gallery in Chelsea
• Walked into Knoedler
  – With a painting under her arm
  – A Mark Rothko
• This was a spectacular find…
An unknown Rothko
-Surfacing twenty-five years after his death

Mark Rothko
- American painter
  - Born: 1903, Daugavpils, Latvia
  - An Abstract Expressionist
- One of the most famous postwar American artists
- In May 2012, Rothko's 1961 painting *Orange, Red, Yellow* sold at Christie's in New York for $86.9 million, a record for a postwar painting at auction

A Rothko  Black in Deep Red, 1957  The Rosales Rothko  Untitled

Freedman's Reaction
- Ann Freedman was dazzled
  - What a find!
  - She consulted informally with several experts
  - None disqualified it as a forgery
  - Knoedler bought it for resale
- Later, one critic was quoted as saying, "Freedman exaggerated certain experts’ informal assessments to bolster the impression that the work was authentic."

Who is Glafira Rosales?
- Born in Mexico in 1956
  - Now a U.S. citizen
  - Living on Long Island, N.Y.
- Married (or not) to Jose Carlos Bergantiños Diaz (Spanish)
- They ran a small gallery in Manhattan
  - On West 19th Street
  - In Chelsea, a well known art district in New York
- Glafira, part of the NY art scene
  - Was elegant and well dressed and
  - Known to Ann Freedman socially

Glafira in her gallery
  Behind her a Tylkina*, a Warhol, and a Kalder
*Yelena Tylkina, born 1965, Belarus, a contemporary NY artist

The Trove Expands
- Over the next several years...
  - Rosales brought more works by Abstract Expressionists to Knoedler
  - Mark Rothko, Jackson Pollock, Robert Motherwell, Willem de Kooning and others
  - All important artists

Provenance
- Where had these paintings been hiding?
- None had been seen in public before
- None were included in the artists' Catalogues Raisonnès
Catalogues Raisonnès

• A Catalogue Raisonné
  – A comprehensive, annotated listing of all the known works of an artist
  – Either in a particular medium or all media

• Inclusion in the CR is considered a guarantee of authenticity
  Example—
  Robert Motherwell Paintings and Collages: A Catalogue Raisonné,
  1941-1991 (date of death) by Jack Flam, Katy Rogers, Tim Clifford

How had Rosales gotten the paintings?
Here is her story…

• She obtained them from a friend, Mr. X
  – Who required absolute secrecy [tax issues(?)]
  – He had inherited them from his father, Mr. X, Sr.

• His father had collected them with help of a NY dealer
  – They had visited the artists' studios together
  – And bought directly from the artists (in the 50s and 60s)
  – The paintings were immediately put into storage
  – Hence, they had not appeared in public nor in the CR's

The Dealer

• The dealer was David Herbert
• A familiar figure in the Manhattan gay art scene
• Herbert planned to use the works to stock a new gallery
  – The gallery would be financed by Mr. X, Sr.
  – But they had a falling out [a gay lovers quarrel (?)]
  – The art remained in Mr. X, Sr.'s basement until his death

• Herbert died some time afterwards, in 1995
  – Now, Mr. X felt he could sell the works

Sound OK?

• Since Mr. X demanded total secrecy, and
• Since his father was dead, and
• Since the dealer, David Herbert was dead, and
• Since all the artists were dead…
  There was no way to verify any part of the story!!!
• The provenance was completely unsubstantiated

Further Sales

• According to Freedman:
  – Rosales brought the works in one at a time

• The price was always fixed
  – Knoedler's profit was whatever it could make over that price

• Soon, Freedman pushed Rosales to introduce her to Mr. X
  – His privacy would be protected, Freedman guaranteed
  – "Not now," Rosales said each time
Meanwhile, a similar scenario was taking place at...
– Julian Weissman Fine Art
– Another New York gallery

The Painting Trail
• The new works were sold for substantial sums to...
  – Various private collectors
  – A few dealers
  – Museums

What was the reaction of art critics to the new works?

The Guarded Response
• Many had reservations…
  – Particularly regarding the provenance
• Nevertheless…
  – No public statements were made.
• Why not?
• Because…
  – Negative assessments of the authenticity of art works
  – Inevitably resulted in lawsuits
• Experts were reluctant to offer official opinions in this atmosphere

The Pollocks(?)
• Among themselves, art dealers and critics questioned the paintings, the Pollocks in particular.
• "They didn't feel right—they were too perfect, too symmetrical," one was quoted as saying.
• But, professionals didn't say anything publicly.
  – Just turned their backs.

Finally, One Critic Speaks Out (2008)
• Jack Flam
  – Professor of Art History
  – Noted author
  – Lead author of the Motherwell catalogue raisonné
• He strongly objects to the Motherwells
  – He hires detectives to investigate Rosales
  – He insists on scientific analysis of the paints
  – In particular, he faults the Rosales "Elegies"

Motherwell sold to Knoedler by Rosales

Elegy to the Spanish Republic No. 110, Robert Motherwell 1971

Jack Flam Condemns
• Rosales's Motherwell Elegy was false
  – It contained pigments not developed until 10 years after the date on the canvas
• Ann Freedman disputed the results
  – Artists were frequently given pigments to experiment with
  – Before they were patented or marketed
• Flam was unmoved
  – He declared the Motherwells "fraudulent"
•The Rosales sales had been going on for 14 years

The FBI Enters
•Word of the Motherwell controversy…
  –Reached the FBI
•The FBI opened an investigation
  –Had there been criminal activity?
  –Was tax avoidance involved?
•Rosales's lawyer, Anastasios Sarikas, stated…
  –His client “never intentionally or knowingly sold artwork she knew to be forged.”

Meanwhile, Back at the Knoedler
•Pierre Lagrange, a Belgian hedge fund manager [net worth $600m]
  –Purchased a Pollock for $17 million
•He inquired about the authentication
  –Ann Freedman told him…
  –There would be a supplement to Pollock's catalogue raisonné
  –The painting would be included
  –Its authenticity would thus be verified
•Lagrange bought the painting and took it home
  –He resides in England

The Lagrange Pollock, price $17 m
But was it authentic? Freedman said yes.

Authentication was going to be difficult… Why?
•The Pollock-Krasner Foundation
  –Established 1985 by Lee Krasner, Pollock's widow
  –Main purpose
•Providing financial aid to working artists
  –Secondary function
    •The examination and judgment of disputed works
    •It performed this task for six years (1990-1995)
  –After 1995, it no longer performed the secondary function. Why?
  –Because of legal challenges to its rulings

Pollock's Catalogue Raisonné
•The Foundation completed the CR in 1995
  –With the publication of Supplement 1
•No further revisions were planned
  [Didn't Ann Freedman know all this?]
•The matter of the inclusion of the Pollock in the CR…
  –Remained unresolved
  –Until…

2011—Pierre and Catherine Split
•After 20 years of marriage
•And three children…
•Pierre, age 49, comes out as gay
•The divorce is amicable but…
  –It will be one of the largest settlements in British history and…
  –Pierre will have to sell much of his holdings to divide the estate

Pierre's New Squeeze
•Pierre declares his love for…
-- Flamboyant male fashion designer Roubi L’Roubi
• They are seen here attending the 2011 Venice Biennale

• The Family Estate in Kensington Gardens
  – It is sold for $140m
  – To Chelsea football club owner, Roman Abramovich

• The Pollock too will have to go
  • Lagrange offers it to both Sotheby's and Christie's for auction

Both Refuse!
• Both auction houses refuse to offer it because…
  – The provenance is unclear
  – It is absent from the catalog raisonné

Lagrange is Furious
• To resolve the authenticity issue…
  – He orders his own forensic analysis
  – He obtains the report on November 29, 2011

• The results are distressing
  – Two yellow pigments used in the painting…
  – Had not been invented until 1970

• Pollock died in a car crash in 1956
  – Hmm….Let's do the math!

Ball in your court, Knoedler
• Lagrange sends the results to Knoedler
• He demands a refund
• The next day, November 30, 2011
  – Knoedler announced
  – It was closing its doors and going out of business

The New York art world was shocked!

High Level Reaction
• The President of the Art Dealers Association of America, Lucy Mitchell-Iness
  – Spoke for many when she said, powerfully,
  "Goodness me! That's pretty stunning"
  [She is, after all, a Brit]

Official Inquiry
• Both the FBI and the U.S. Attorney's office
  – Investigate the question of illegal activity

• On May 21, 2013, Rosales was arrested and imprisoned
• On July 17, she is charged
  – It is a $30 million fraud scheme
  – At least 60 fake works of art have been sold to two galleries
  – The resale of the pictures brought in over $80 million
  – August 12—she is released on $2 million bail

Rosales Pleads Guilty  (September 16, 2013, two months after charges were filed)
• She pleads guilty to…
  – Fraud and wire fraud
  – Tax evasion
  – Money laundering

• Sentence could be up to 99 years.
• The plea deal
  – She will forfeit $33.2 million
  – Including her home in Sands Point, N.Y.
She will pay up to $81 million in restitution

**Sentencing Postponed**

- The case is complex involving
  - Knoedler Gallery
  - Julian Weissman Fine Art
  - Christie's
  - The Kemper Museum of Contemporary Art, K.C.
  - And numerous dealers and collectors
- Rosales continues to negotiate with prosecutors
  - But so far, her co-conspirators are not publicly named

**Meanwhile...**

- Knoedler, Ann Freedman, and Julian Weissman
  - Are all being sued
  - In civil court
  - By various clients
- The chief claim is...
  - These experts should have never accepted the authenticity of the works
  - You bet!

**The Co-Conspirators Indicted**

<table>
<thead>
<tr>
<th>Pei-Shen Qian</th>
<th>Jose Carlos Bergantiños Diaz</th>
<th>Jesus Angel Bergantiños Diaz</th>
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- March 31, 2014 (six months after Rosales's guilty plea)
  - Rosales's negotiations with prosecutors yields the names of three co-conspirators
  - They are
    - Pei-Shen Qian, the painter, age 73, Chinese
    - Jose Carlos Bergantiños Diaz, Rosales's husband or boyfriend, Spanish
    - Jesus Angel Bergantiños Diaz, brother of Jose (no image), Spanish

**Who was the artist?**

- The astounding fact is...
  - All of the 60 forgeries were painted by one man
  - Pei-Shen Qian
- And who was he?
  - An immigrant from China
  - Who worked out of his house in Queens

**Where are they now?**

- At the time of the indictment
  - Qian, the painter, had returned to Shanghai
  - The Diaz brothers were in Spain
  - The U.S. gov't will presumably request extradition of the Diaz's
  - Because they had been the receivers of large amounts of money
  - Which was deposited in Spanish banks

**How did the scheme work?**

- Jose Bergantiños was...
  - The instigator
  - And mastermind
- He discovered Qian selling paintings
On a street corner in lower Manhattan
And recognized his talent

**Shanghai landscape, #2 (2000)**  Pei-Shen Qian
Shown in a 2006 retrospective at the Xiang Jiang Gallery Shanghai

**Bergantiños's Crafty Scheme**

- Old paintings obtained
  - Qian was to use the canvas in the forgeries
- Old paints (from 50s and 60s) sought
- Obtained old furniture
  - To extract the old masonite
  - Often used by AbEx's as painting base
- Finally, subjected the fake paintings to…
  - Heating, cooling, outdoor exposure, blow drying
  - To give the works the appearance of age

The result: Fake Pollocks, Motherwells, Rothkos, and others that escaped detection for over 10 years

**Paying the Painter**

- At first, Qian received a few hundred dollars per painting
- In 2003, Qian saw one of his paintings
  - In a booth in an art show in Manhattan
  - Price—far in excess of what he was paid
- Thereafter, Qian demanded and received
  - From five to nine thousand dollars per painting
  - From 2005 to 2008, the amount totaled $50,400
  - During this period, the Perps took in about $20 million

What are the lessons to be learned from this story?

- Science can be fooled if…
  - Old paints are used
  - Old canvases/masonite are used
  - Particularly true if the original work dates from only 50 years prior
- Connoisseurship is usually reliable but
  - Can't be counted on when self interest comes into play
  - Is unreliable in an atmosphere of fear of litigation
- Provenance is reliable, but is apparently easy to ignore when judgments are clouded by greed.

**The Moral**

- Money corrupts
- Big money corrupts absolutely