

Introduction to Pigments and Paints



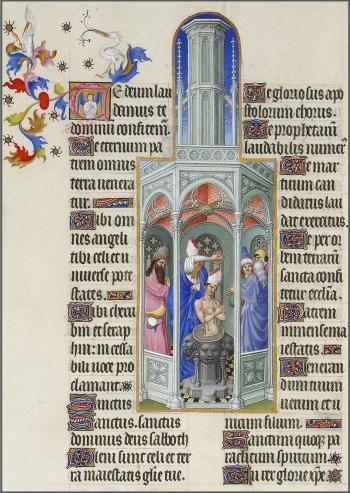
The Making and Knowing Project
Last updated September 2021 by NJR



Color in Art

Painting
Drawing
Manuscripts
Sculpture

Stained glass
Ceramic
Textile
Jewelry



Paints

Pigments



Paint = pigment + binding media

Pigment



Binding media

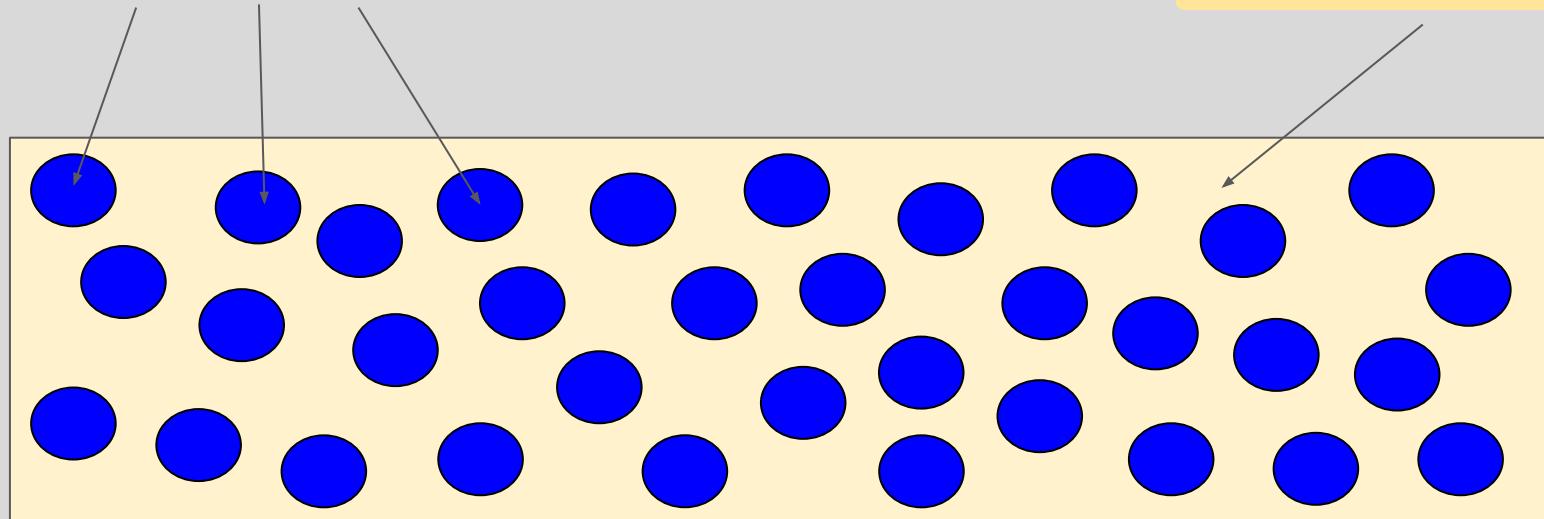


Paint



Pigment particles

Binding medium

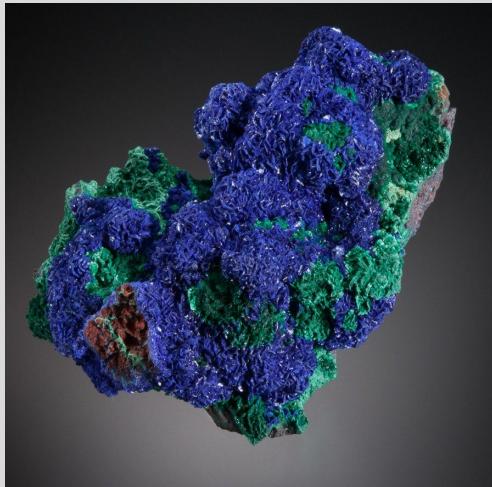


Substrate (paper, canvas, wood)

Natural Pigments

Mineral

“Mineral”



Azurite (copper carbonate)

Earth



Venetian Red (ochre)

Organic
Plant or Animal



Weld (*Reseda luteola*)

Brussels Manuscript, 17th century

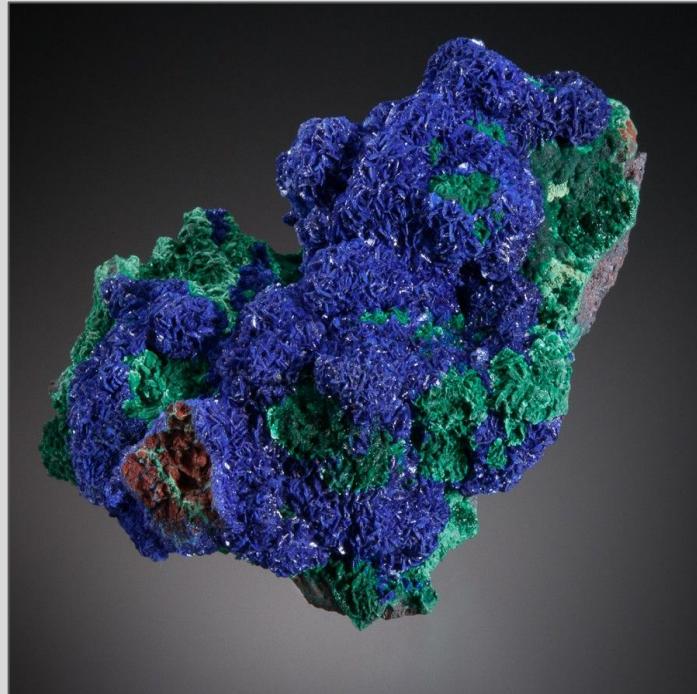
*Colours [pigments] are formed in the **earth** and in **mines**, or are **composed by mixtures and combination**, or are **extracted from herbs or otherwise**.*

OUTLINE

For each pigment type:

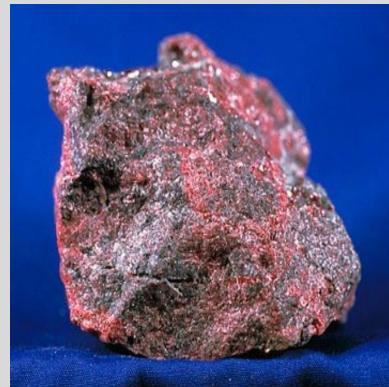
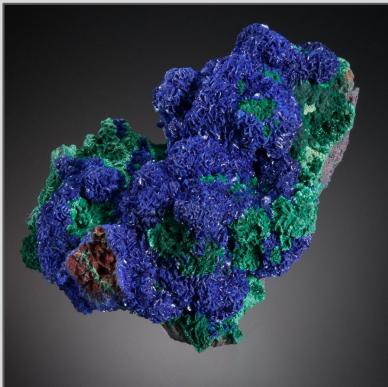
- Raw materials
- Context as pigment and paint
- Preparing and using pigment: historical recipe or application

“Mineral” Pigments



Azurite

“Mineral” Pigments



“Mineral” Pigments

Azurite
(copper carbonate)

Cinnabar,
Vermillion
(mercuric sulfide)

Orpiment
(arsenic trisulfide)

Verdigris
(copper acetate)

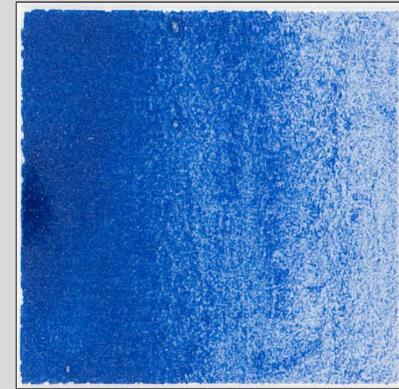
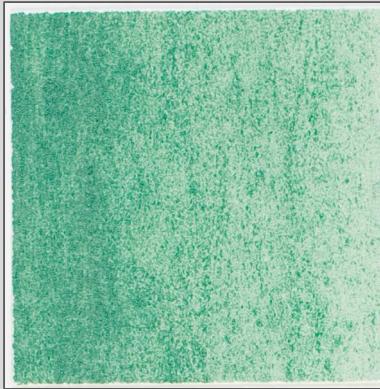
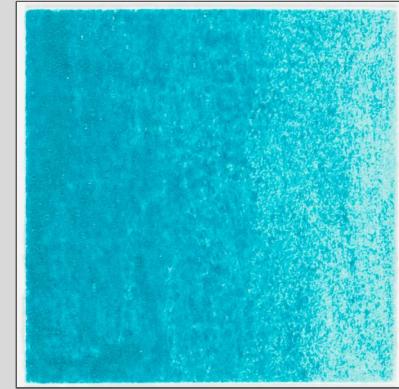
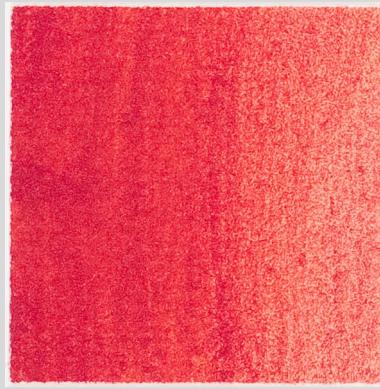
Minium,
Red Lead
(lead tetroxide)

Malachite
(copper carbonate)

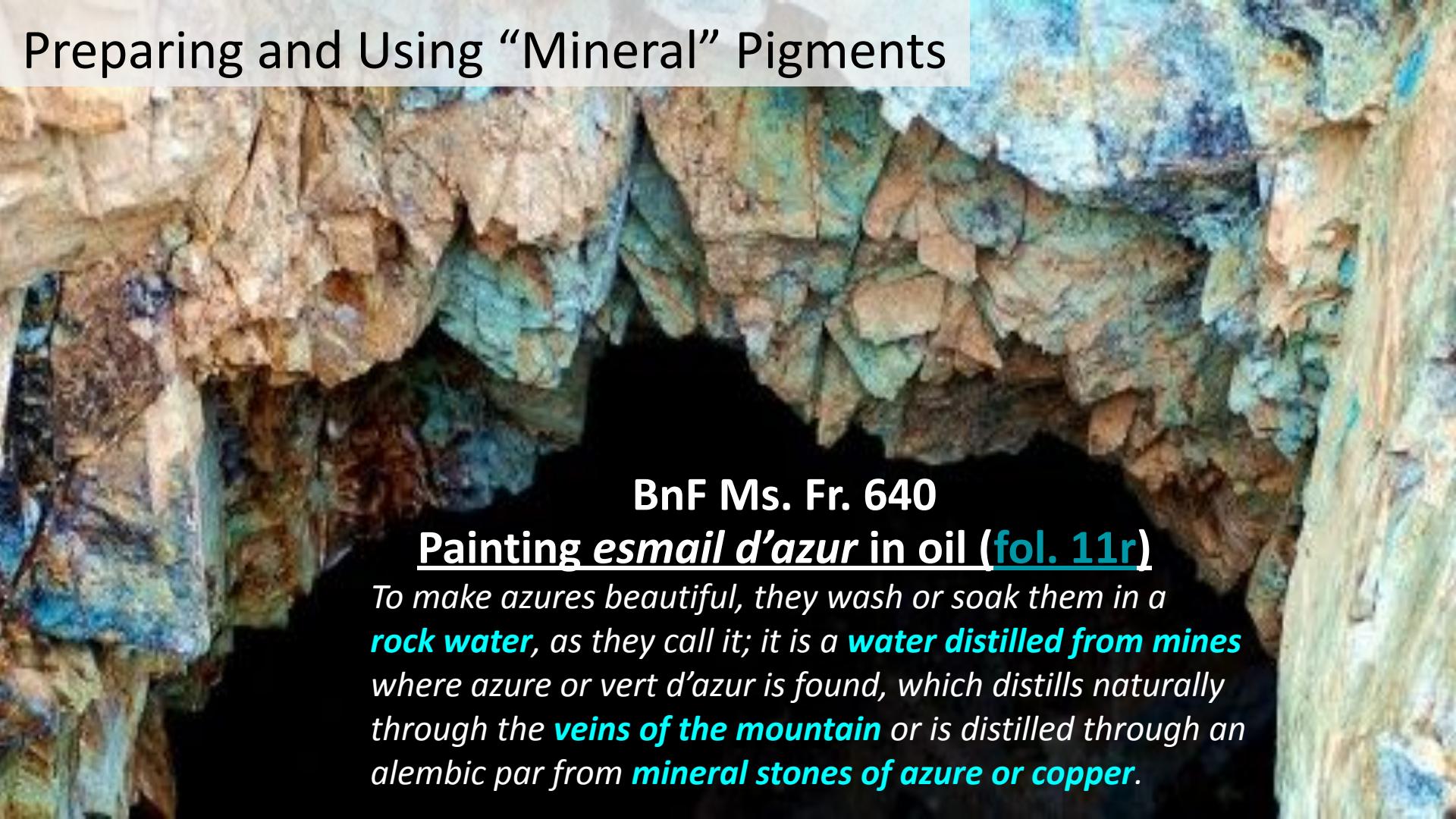
Lead White,
Ceruse
(lead carbonate)

Lapis Lazuli,
Ultramarine
(lazurite)

“Mineral” Pigments



Preparing and Using “Mineral” Pigments



BnF Ms. Fr. 640

Painting esmail d'azur in oil (fol. 11r)

*To make azures beautiful, they wash or soak them in a
rock water, as they call it; it is a water distilled from mines
where azure or vert d'azur is found, which distills naturally
through the veins of the mountain or is distilled through an
alembic par from mineral stones of azure or copper.*

Preparing and Using “Mineral” Pigments



Painting esmail d'azur in oil (fol. 11r)

*The main thing is to **grind it well on marble**, and before that, to **have washed it thoroughly**.*

Preparing and Using “Mineral” Pigments



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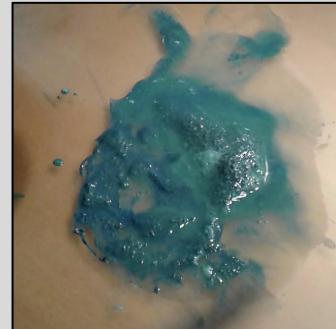
Preparing and Using “Mineral” Pigments



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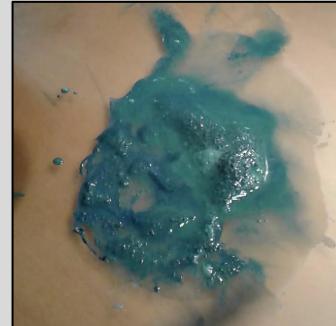
Preparing and Using “Mineral” Pigments



Painting esmail d'azur in oil (fol. 11r)

Wash it in clear water & with a sponge remove the colored water after it starts to go to the bottom, and in this manner you will extract the very delicate flower, which will be easy to work with.

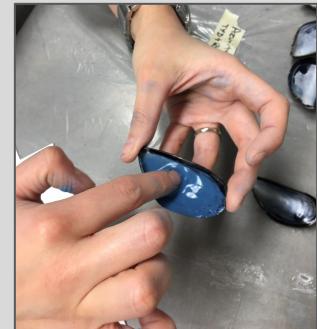
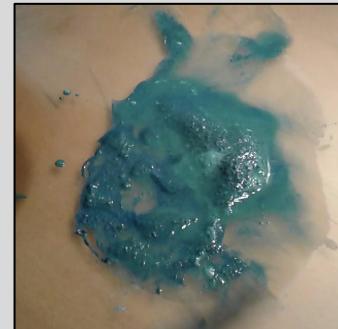
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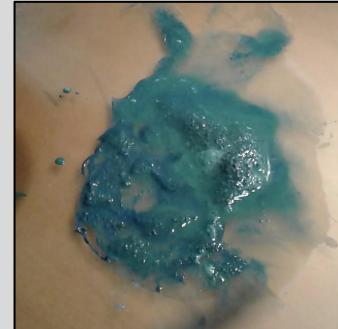
Preparing and Using “Mineral” Pigments



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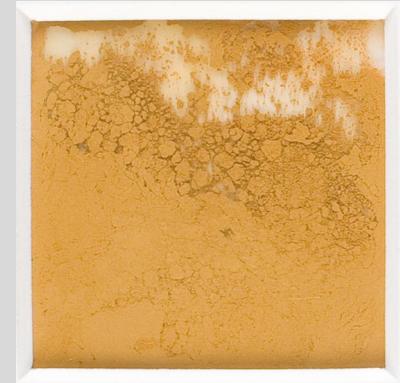


Earth Pigments



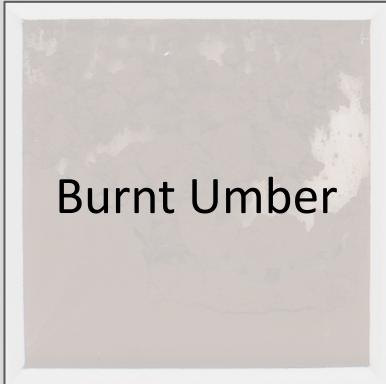
Venetian Red (ochre)

Earth Pigments



Earth Pigments

Burnt Umber



Burnt Sienna



Raw Umber



Yellow Ochre



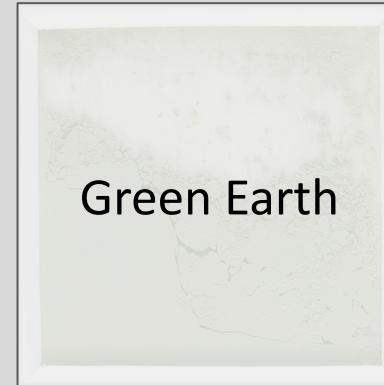
Brown Ochre



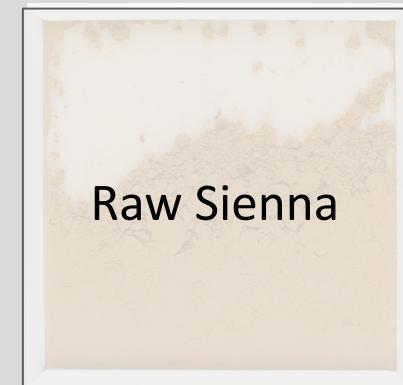
Red Bole,
Red Earth



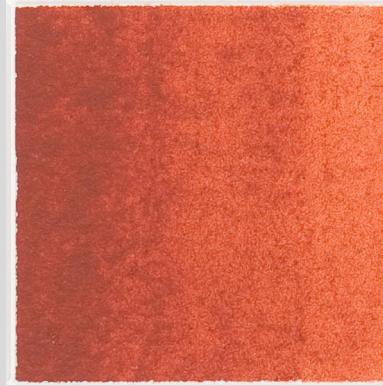
Green Earth



Raw Sienna



Earth Pigments



“Brussels Manuscript”

- *Ochre-coloured earth being taken from the veins of marble*
- *"Rubrics," or "bloodstones," are also taken out of the earth*
- *Green chalk, or "verd de terre," —that brought from Smyrna is the best*
- *English red, otherwise called brown red, red ochre, yellow ochre, umber, and yellow earth, are formed in the earth*



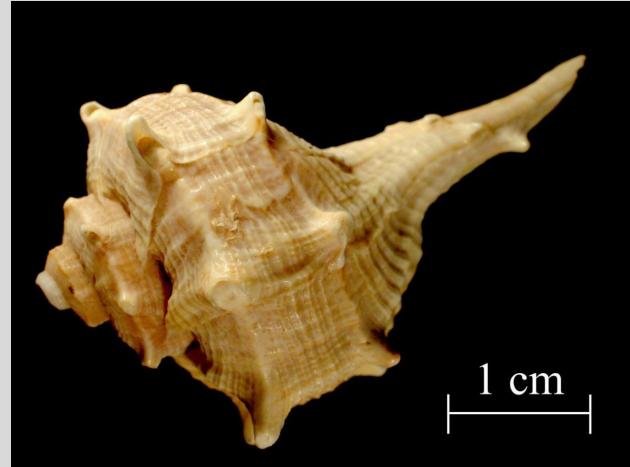
“Brussels Manuscript,” 17th Century. Mary P. Merrifield, *Medieval and Renaissance Treatises on the Arts of Painting: Original Texts with English Translations* (1849, Dover Publications, 1969), p. 804-810

Organic: Plant or Animal Pigments



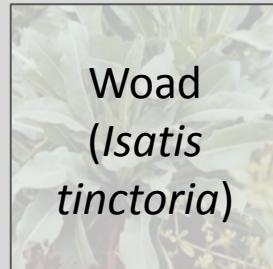
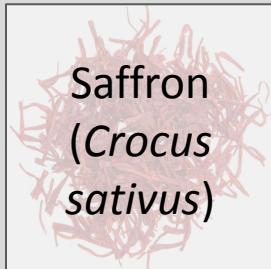
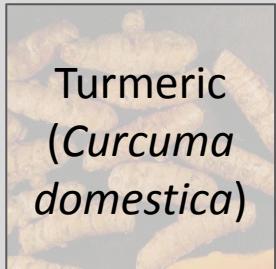
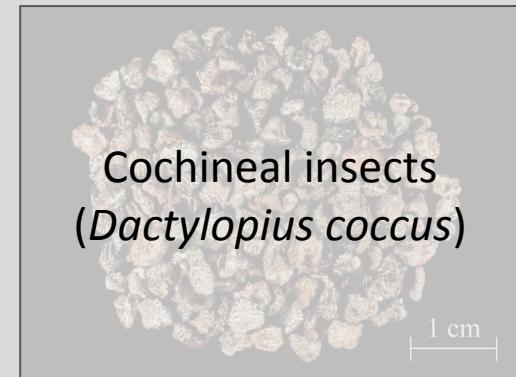
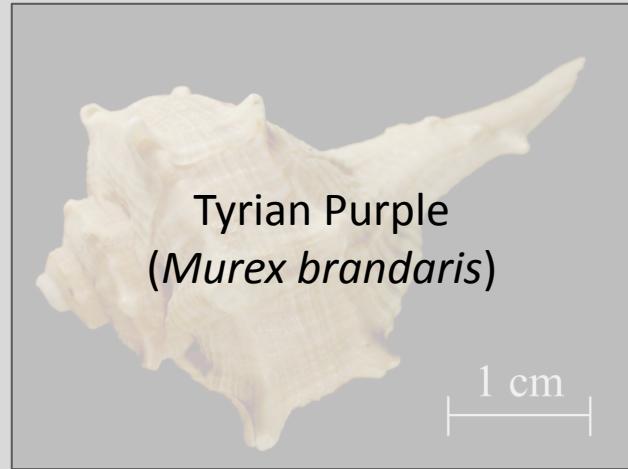
Weld

Organic: Plant or Animal Pigments

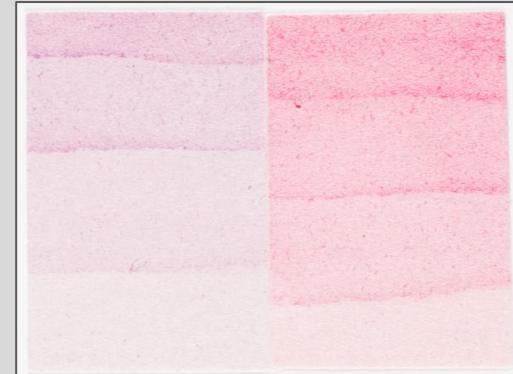
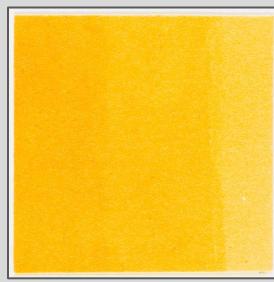
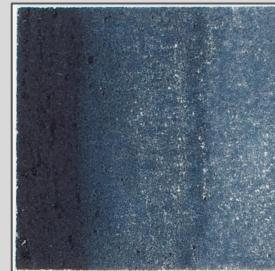
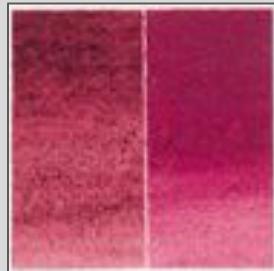
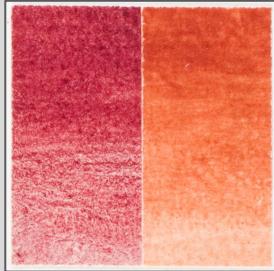


1 cm

Organic: Plant or Animal Pigments



Organic: Plant or Animal Pigments



Preparing and Using Organic Pigments



Crush dried cochineal



Extract



Precipitate



Filter and wash



Pigment



Paint

Recipe Example: Making Pigment from Cochineal

Another sort of fine lake. Take 12 grains of powdered cochineal or fine grana, add to it 2oz of ley; leave the infusion for about 2 hours; strain it through a linen cloth and put it over hot cinders; When it boils add to it pulverized roche alum of the size of 2 peas then the ley will make a thick red scum; as soon as this happens throw it all onto a stretched linen cloth, when the clear ley will pass through leaving the coagulum on the cloth, which coagulum must afterwards be dried and made into tablets.

“Paduan Manuscript,” (anonymous, Venice, late 16th-17th century)

Mary P. Merrifield, *Medieval and Renaissance Treatises on the Arts of Painting: Original Texts with English Translations* (1849, Dover Publications, 1969), p. 702.

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Binding Media

Binding media



Egg

Tempera

Glaire



Glue



Oil



Gum

Watercolor

Ink

Binding media



Egg

Tempera

Glaire



Glue



Oil



Gum

Watercolor

Ink

How the binding medium and pigment are combined

Pigment



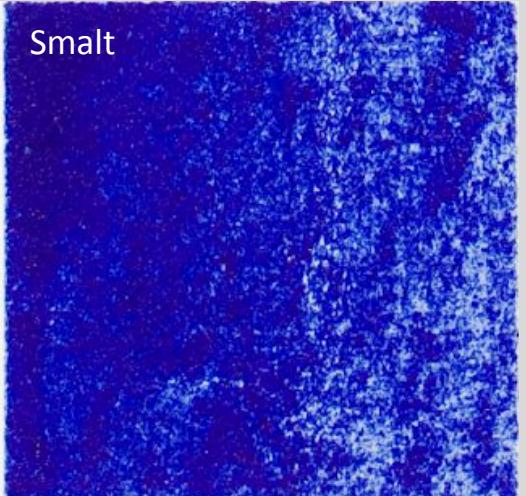
Binding media



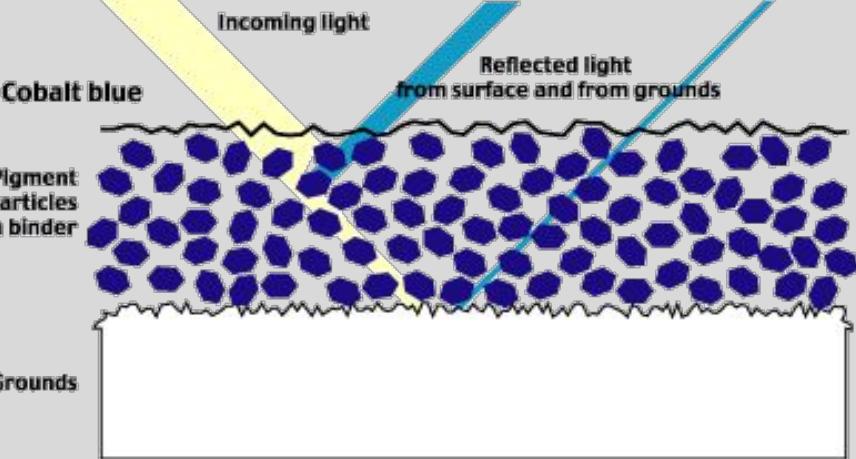
Paint



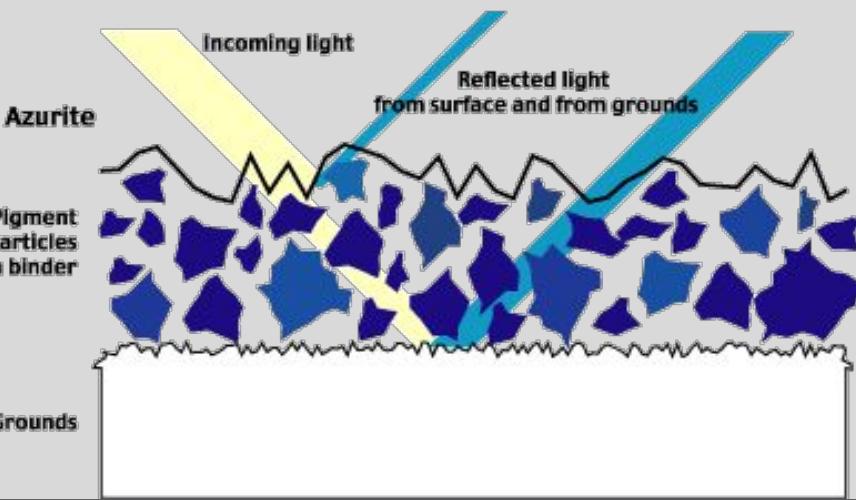
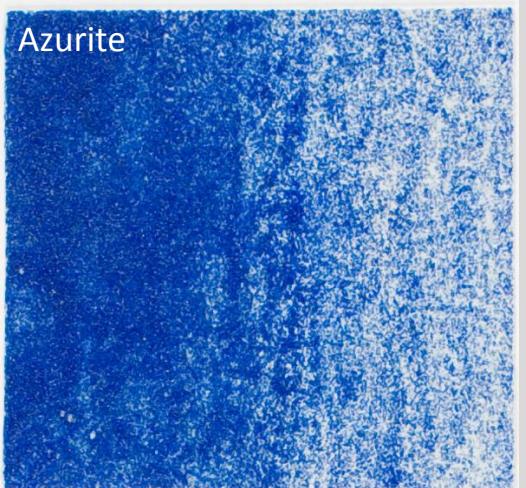
Small



Tinting strength
Covering power
Opacity
Translucency



Azurite



Gum Glair Tempera Linseed oil Walnut oil



BnF Ms Fr 640, [Folio 32r](#): “The one who knows to work well in distemper will work well in oil. But, on the contrary, the one who knows how to work well in oil will not work in distemper.”



Substrate

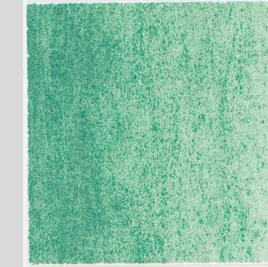
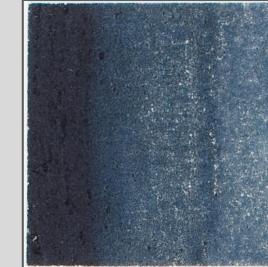
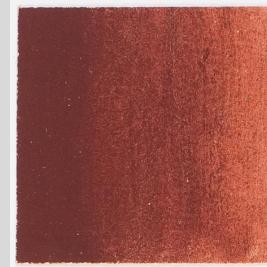
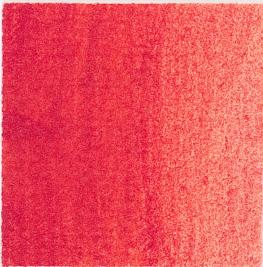
Substrates or Surfaces

- The surface upon which paint is applied is often referred to as the substrate
- Common examples include:
 - Paper
 - Usually “sized” with gelatin or gum to help paint adhere and to make the paper more hydrophobic—preventing it from tearing or bleeding if it absorbs too much water
 - Parchment
 - Canvas
 - Woven linen cloth stretched to create a taut surface, sometimes also aided by a layer of animal glue size. Ground layers consisting of opaque paints such as lead white are also often applied below the painting
 - Wood panel and board
 - Typically prepared as a painting surface by applying layers of gesso (animal glue mixed with very fine chalk) to create a very smooth surface
 - Plaster or chalk (fresco or mural paintings)
 - Metal
 - Glass



Summary

- Different categories of pigments reflect their different sources
- These categories often require different methods of preparation (and, as we will see, application)
- Different binding media also have their own particular characteristics
- The substrate the paint is applied upon interacts with the binding media and the paint, sometimes requiring special preparation
- The way paintings look depend on the various properties of the pigments, the binding media, and their combination as a paint
- To understand paintings, we need to know about
 - The materials themselves
 - Their preparation
 - Their application
 - Their optical properties



Questions for consideration

- **Embodied experience:**
 - How does it feel to grind pigment into the linseed oil using the muller?
 - How does this compare to the mixing required for the glue?
 - How does it feel to apply a glue-based paint vs. an oil paint?
 - Is there a difference in the way each paint wants to be handled or flows off the brush?
 - What kind of movements help you apply an even layer?
- **Artisanal knowledge:**
 - What kind of knowledge would you need in order to prepare, apply, handle, appreciate these materials?
 - How might you acquire that knowledge today and historically?
- **Asking new questions:**
 - What new questions does this experience cause you to ask about paintings or other works of art in general?



References and Resources

- <https://travelingscriptorium.wordpress.com/>
- <https://www.naturalpigments.eu/artist-materials/cat/art-support-info/post/sizing-paper-gelatin/>
- <https://www.naturalpigments.eu/artist-materials/cat/art-support-info/post/preparing-tempera-painting-support/>

Images

- [Book of Hours. Use of Rome]. [France (Tours?) or Flanders, ca. 1525]. Illuminated manuscript on vellum. (BRMS16), The Ruth and Lyle Sellers Medical Collection.
<https://www.smu.edu/Bridwell/SpecialCollectionsandArchives/Exhibitions/Manuscripts/DevotionalBooks/BRMS16-HoursRome>
- Jean de Dinteville and Georges de Selve ('The Ambassadors'), 1533, Hans Holbein the Younger. Oil on oak. 207 x 209.5 cm. NG1314.
<https://www.nationalgallery.org.uk/paintings/hans-holbein-the-younger-the-ambassadors>
- The Adoration of the Magi, ca. 1465, Justus of Ghent. Distemper on canvas. 43 x 63 in. (109.2 x 160 cm). <http://www.metmuseum.org/art/collection/search/436803>
- Sandro Botticelli, The Birth of Venus, c. 1484–1486, Uffizi Gallery, Florence, Italy. Tempera on canvas. 172.5 x 278.5 cm. <https://www.uffizi.it/en/artworks/birth-of-venus>
- Gum arabic: <https://www.tradeindia.com/Seller-9058299-R-Mavji-Co-/arabic-gum.html>
- Linseed oil: <https://www.naturalpigments.com/cold-pressed-raw-linseed-oil.html>
- Rabbit skin glue: <https://www.adam-eshop.com/en/lascaux-conservation-products/7440-adhesif-acrylique-498hv-lascaux.html>
- Mulling setup: <https://www.cutoutandkeep.net/blog/2015/12/hblyth-and-co>
- Cochineal: Photomacrograph of dried cochineal bodies. Photo credit: Keith Lawrence, Museum of Fine Arts, Boston. http://cameo.mfa.org/wiki/File:Cochineal_dried_bodies_1.jpg
- Tyrian purple: Photomacrograph of shell of Murex brandaris. Photo credit: Keith Lawrence, Museum of Fine Arts, Boston. http://cameo.mfa.org/wiki/File:Murex_brandaris_1.jpg
- Woad plant. Isatis tinctoria L. Image credit: <http://www.leuchtendgruen.net/botani>. <http://cameo.mfa.org/wiki/File:Isatis.jpg>
- Saffron: <https://www.exportersindia.com/indian-suppliers/saffron.htm>
- Turmeric: <https://www.scienceofcooking.com/food-encyclopedia/tumeric.htm>
- Cut pieces of brazilwood. (Caesalpinia brasiliensis). Photomacrograph of cut pieces of brazilwood. From the Margaret Whiting Collection. Photo Credit: Keith Lawrence, Museum of Fine Arts, Boston.
http://cameo.mfa.org/wiki/File:Brazilwood_raw.jpg
- Buckthorn berries: <https://nyc.books.plantsofsuburbia.com/rhamnus-frangula-frangula-alnuseuropean-buckthornrhamnaceae/>
- Madder root: http://cameo.mfa.org/wiki/File:Madder_root_1.jpg
- Ochre: <https://geokult.com/2014/04/23/the-magic-of-ochre-australia-and-france/>
- Mine: <https://www.shutterstock.com/image-photo/vertical-mine-shaft-inactive-copper-mojave-28734310>

Images (continued)

- Lapis lazuli: https://www.amazon.com/Bingcute-Natural-Polished-Afghanistan-Crystals/dp/B0721KNT23/ref=pd_lpo_2?pd_rd_i=B0721KNT23&psc=1
- Cerussite : PbCO₃. Flux Mine, Flux Gulch, Alum Gulch, Harshaw Mining District, Patagonia Mountains, Santa Cruz Co., Arizona, USA. © 2002 John H. Betts. <https://www.mindat.org/photo-3801.html>
- Minium : Pb₃O₄. Old Yuma Mine, Saguaro National Monument, Amole Mining District, Tucson Mountains, Pima Co., Arizona, USA. Copyright © 2008 Michael C. Roark. <https://www.mindat.org/photo-143974.html>
- Orpiment: As₂S₃. Twin Creeks Mine, Potosi Mining District, Osgood Mountains, Humboldt Co., Nevada, USA. Antonio Borrelli. <https://www.mindat.org/photo-38826.html>
- Cinnabar. Image credit: Minerals and Materials Photo Gallery.. [Minerals in Your World](http://cameo.mfa.org/wiki/File:Cinnabaremr1.jpg). <http://cameo.mfa.org/wiki/File:Cinnabaremr1.jpg>
- Weld (Reseda luteola) - Stock Image - B834/2524 - Science Photo Library. Creator: BRUNO PETRIGLIA/SCIENCE PHOTO LIBRARY. <https://www.sciencephoto.com/media/62635/view/weld-reseda-luteola>
- Gum arabic with pigment: <http://www.seamlessexpression.com/blog/2018/9/1/ai0kc5r492c2xxac5gle819bnvh03c>
- Bacchus and Ariadne, 1520-3, Titian. Oil on canvas. 176.5 x 191 cm. NG35. <https://www.nationalgallery.org.uk/paintings/titian-bacchus-and-ariadne>
- Bust-Length Study of a Bearded Man with Cap in Three-Quarter View, 1510–92, Jacopo Bassano (Jacopo da Ponte) Italian. Pastel and charcoal on blue paper. 5 1/4 x 4 1/2 in. (13.3 x 11.4cm). Accession Number: 1999.164. Public Domain. <https://www.metmuseum.org/art/collection/search/337884>
- The Unicorn Rests in a Garden (from the Unicorn Tapestries), 1495–1505. Wool warp with wool, silk, silver, and gilt wefts. Dimensions: Overall: 144 7/8 x 99 in. (368 x 251.5 cm). Public Domain. Accession Number: 37.80.6. <https://www.metmuseum.org/art/collection/search/467642>
- Pendant, 16th century, Gold, rock crystal, enamel, verre églomisé. Overall: 2 7/8 x 2 1/8 in. (7.3 x 5.4 cm). Accession Number: 17.190.908. Public Domain. <https://www.metmuseum.org/art/collection/search/193693>
- Les Très Riches Heures du duc de Berry, Folio 37v - The Baptism of Saint Augustine the Musée Condé, Chantilly. Public Domain. https://commons.wikimedia.org/wiki/File:Folio_37v_-_The_Baptism_of_Saint_Augustine.jpg
- Stained Glass Panel with the Visitation, 1444, German. Pot metal, white glass, vitreous paint, silver stain, olive-green enamel. Accession Number: 13.64.3a, b. Public Domain. <https://www.metmuseum.org/art/collection/search/463648>
- Platter, last quarter 16th century, Follower of Bernard Palissy French. Lead-glazed earthenware. Overall: 20 1/2 x 15 5/8 x 2 13/16 in., 5.5 lb. (52.1 x 39.7 x 7.1 cm, 2472.5 g). Accession Number: 53.225.52. Public Domain. <https://www.metmuseum.org/art/collection/search/201633>
- Pictures from TALAS Conservation & Archival Supplies: <https://www.talasonline.com/>
- Pigment samples: <https://travelingscriptorium.wordpress.com/>
- The Making and Knowing Project, <https://www.flickr.com/photos/128418753@N06/albums>