



Ochre

What is Ochre?

Ochre (also spelled ocher) is a naturally occurring mineralized form of iron oxide (Fay, 1920 p. 468). It is typically found in a powdery or granular form. It can be mixed with water or other binders to create paint, which is its most common use. Iron and oxygen are the two basic elements in ochre, but the presence of hydrogen and other metals that create different chemical compositions cause different hues of ochre, whether natural or man-made.

Ochre was used by early humans for paints, pigments tattoo inks, and burial coverings (Hirst, 2019). Its use as a preservative for boat sails and fishing equipment has been long known to maritime communities, and it used to be commonly employed in fine art, and interior, and exterior painting (Jarvis and Barrett, 2020, p. 2-7). Ochre is still used for some of these purposes today, but its use as a pigment has largely been supplanted by synthetic colorants. Ochre mostly occurs as a yellowish-brown color. However, it's shades can range from pale yellow to deep red, deep orange, brown, and even deep violet (fig. 1).



Figure 1: Different kinds of ochre pigments (from New Riverside Ochre). Ochre isn't one distinct color. Rather, it's a family of colors produced by clay pigments which contain hydrated ferric oxide (commonly known as rust).

"Ochre" generally refers to the yellow hues while "red ochre" obviously refers to the red variety, but other common types of ochre include sienna and umber (both as "raw" or "burnt" pigments), with hues ranging in the brown family.

Some examples of different compositions are, hematite will make ochre red, and manganese and goethite will create brown tones (Geggel, 2018; O'Hanlon, 2023; Rock Seeker, 2024). Burning ochre results in different colors because of a change in chemical composition; oxidation and hydration are the main causes of color variation (Hirst, 2019).

Ochre has longevity because it is a pure, natural pigment; this is evidenced by the prehistoric cave paintings in which it was used (Geggel, 2018). Ochre is thought to be the earliest known paint source used by humans. "The earliest possible use of ochre discovered so far is from a Homo erectus site about 285,000 years old at the site called GnjH-03 in the Kapthurin Formation of Kenya" (Hirst, 2019).

New Jersey Ochre Discoveries

Ochre's importance in the State did not go unnoticed. In New Jersey, a layer of "very excellent yellow ochre" was found near a bog iron ore deposit in the Mullica Hill-Woodstown area of Gloucester County in the early 1800s (Rogers, 1836, p. 22). Cumberland County also had ochre occurring with bog iron ore (Gordon, 1834/2008, p. 125).

Later in the century, ochre beds that had been worked for two years in Harmony Township, Warren County had already supplied approximately 400 tons of processed material of a buff to yellow color. The Warren County deposit was accessed by open roadside pits, no more than 18 feet deep at the time (Cook, 1872, p. 31).

Ochres of various colors were known in Morris County by the early 1800s (Gordon, 1834/2008, p. 185). At Schooley's Mountain in northwestern Morris County, ochre was extensive in rocks and soil (Gordon, 1834/2008, p. 234). This is no surprise since much iron mining was also done in this area where the ochre was found. Ochre is often located close to iron ore deposits (Armstrong, n.d.). As iron deposits are weathered, water displaces and deposits the chemically altered minerals in sand, limestone, or any other porous surrounding material. Ochre can also be found exposed around caves and valleys, where it easily weathers out of sediment and rock (Geggel, 2018).

George H. Cook, New Jersey's third State Geologist suggested searching for certain desirable materials such as ochre in unconsolidated sediments simply by boring with an auger (Cook, 1872).

The Paint Springs

On Kittatinny Mountain in Warren County near the Delaware Water Gap lies Paint Spring. It is northeast of Mount Tammany in Worthington State Forest not far from Sunfish Pond, on land over 1,000 feet above the Delaware River (Koppenhaver, 2006). Paint Spring deposits ochre in the valley on the west



Figure 2: Paint Spring Ochre depositon Kittatinny Mountain, Warren County (Photo from *Old Mine Road, On That Road Again*, By Bob Koppenhaver.

side of Kittatinny Mountain (fig. 2). Paint Springs “two small pools are surrounded by rich rusty orange “mud” deposits, the pigments of which could be used to make paint or, mixed with bear grease, maybe even war paint!!” The “Paint Spring Lot” was surveyed a couple of hundred years ago, indicating early interest in these pigments. Or perhaps the rusty deposits pointed to iron ore in the mountain” (Koppenhaver, 2006).

There were also concentrations of ferruginous ochre at Paint Island Spring in Freehold Township, Monmouth County (Gordon, 1834/2008, p. 203). Paint Island Spring, quite far away from Paint Spring near the Delaware Water Gap, and in a completely different geology, had extensive iron oxide as an insoluble yellow ochre; when heated it became a “beautiful brown” umber. As a result, paint was manufactured from it, hence the Paint Island Spring name (Gordon, 1834/2008, p. 203). Ochre at Paint Island Spring is still visible and can be found along Paint Spring Road in

Monmouth County (fig. 3).



Figure 3: Ochre deposits at the Paint Island Spring. (Photo, T. Pallis)

Processing of Ochre

The initial processing of ochre to obtain a pure powder involves collecting and sorting the material, washing, sieving out sand, stone, and other materials, drying, and then rolling the resulting powder to a fine consistency (Cook, 1872, p. 32). The color of ochre can be changed by heating and hydration, which results in reds and browns. This seems to have been known since prehistory, with evidence of heat-treated ochre at Stone Age sites (Hirst, 2019).

Native American Use

Archaeological sites across North America, including New Jersey, have yielded evidence of ochre use. Excavations have uncovered ochre-stained artifacts, rock art, and remnants of ochre processing areas. These findings provide valuable insights into the cultural practices and daily lives of Native American communities. The use of earth pigments is regarded as a sacred practice amongst Native Americans across North America. Not only integrating the paints into their everyday tools but also painting their faces to show status, during celebrations, and for mourning the dead. Up until the early 19th century, a mysterious Native American group using these pigments was believed to exist in the northeastern United States.

When anthropologist Charles Willoughby discovered several indigenous grave sites in Maine, he inspired archaeologist Warren Moorehead to excavate the site (Moorehead, 1922). Moorehead’s excavation unearthed fire making stones, woodworking tools (fig. 4), pear-shaped fishing plummets, and a wide variety of blades and arrowheads which were all intermixed with chunks of ochre exhibiting a red coloration (Moorehead, 1922).

Furthermore, the Lenape Tribe residing in parts of New Jersey, Pennsylvania, and Delaware utilized red ochre to color their faces and clothing as well. Often elder men of the tribe had a decorative hairpiece called a roach that was dyed with the ochre pigments (Alchin, 2012).



Figure 4: Ochre stained celt from a collection of artifacts in Maine (from Arrowheads.com).

Summary

Ochre has been used throughout human history dating back about 285,000 years ago, with evidence of use across the world in places like Kenya, Spain, and even New Jersey. New Jersey ochre deposits have been found in rocks, clay beds, and even springs and bogs, and were the first forms of paint and dye used by the native peoples and European settlers. Ochre is no longer used for as many purposes, but it is still widely appreciated for its longevity and smooth earthy coloration.

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Banner photograph: Paint Island Spring, Monmouth County.
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