

Colours through history: a brief journey amongst some pigments

Colour above all, and perhaps even more than drawing, is a means of liberation.
(Henri-Emile Matisse)

Colours are part not only of our culture and our figures of speech, but also of our daily life. Only rarely, however, do we stop to think of the primary role that colours have in our lives. For example, let's think of how many branches of learning and professions, common in our society, work with colours. Physicists, chemists, biologists, psychologists, anthropologists. As well as artists, graphic artists, architects, and experts in communications and marketing, naturally. And some branches of medicine are even investigating the effects of colours on our humour and our vital functions.



Colour samples

In 2015, for example, neurological research led by Prof. Barbanti of the San Raffaele Pisana Institute for Treatment and Research in Rome has shown that there is a correlation between colour, humour and sometimes some vital parameters. For example, green and blue may reduce heart rate, blood pressure and breathing rate; red can help to activate the front right cortex; black is the colour preferred by patients suffering from depression, who tend to refuse major visual stimuli. If associated with some traditional treatments, these items of information may be useful: for example, warm tones (like red) may help to improve humour, while cold tones (like some blues) may help to fight anxiety, muscular tension and high blood pressure.

But how do we colour the objects and spaces that we surround ourselves with? Science and technology now make everything seem easy to achieve, but in ancient times, what were colours obtained from? We offer below a journey through some of the pigments most used in the history of man.

Red

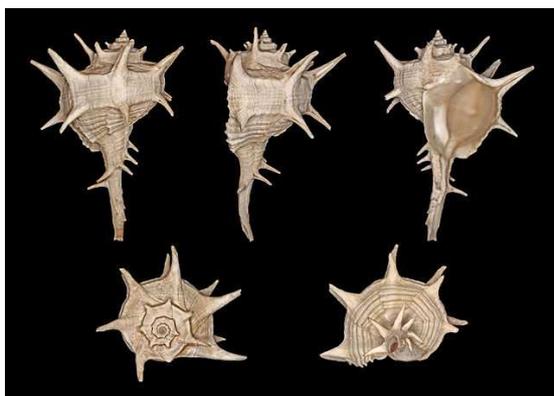
One of the colours that in our culture is most packed with meaning is certainly red, the symbol of love and passion. Up to relatively recent times, to produce shades of red, humans used pigments originating from plants, animals and even minerals.

Of these pigments, one that has been most used – and is still in use – is certainly cochineal. Cochineal red is of animal origin and in particular derives from a family of insects, cochineals, closely related to ladybirds (the two species most used are the *Dactylopius coccus* and the *Kermes vermilio*). The female cochineals produce the red pigments by secreting a very dense and highly coloured liquid, carminic acid to defend themselves from predators. Cochineal was used by the Aztecs as a dye and as a pigment for painting and was brought to Europe from America in the 16th century.

The origin of the word “carmine” appears to derive partly from Sanskrit (*krmi* = worm) and partly from Latin (*minium*= cinnabar or red lead).

According to FAO, to produce a kilo of dye you need around 80-100 thousand insects, which in Europe are bred mainly in Spain in prickly pear plantations. The largest concentrations of carminic acid are produced above all by fertilised female insects, whose bodies are dried and crushed.

Today the dye that derives from cochineal (E120) is often replaced by substances synthesised in laboratories, like E122 and E124. For example, some Italian drinks historically known for their red colour no longer use natural cochineal. These include Aperol, Campari soda, Martini rosso, Sanbitter and Ginger, which can therefore now be drunk even by vegetarians.



Murex brandaris (source Wikipedia)

Another red that was definitely known in ancient times is Tyrian purple, on which the Phoenicians, from the second millennium BC, founded much of their trade and their riches. Indeed, it appears that the origin of the word Phoenician derives from the Greek word “*phoinos*”, meaning “red blood”, because the merchants sailing on the Phoenician ships were often reddened by exposure to wind and their clothes were made of red dyed fabrics. But where does Tyrian purple come from? This valuable pigment can be found in nature in the *Murex*, a genus belonging to the gasteropoda class (to which snails also belong), which in turn belongs to the mollusca phylum. The three species of gasteropoda used from ancient times by Mediterranean peoples to produce red dye are the *Murex trunculus*, the *Murex brandaris* and the *Purpura heamastoma*. Each of these secrete fluids from particular glands and when exposed to air and light, these fluids turn red, tinged with more or less blue.

Blue

One of the most ancient blues used by humans is certainly the so-called Egyptian blue (also known as blue frit, Herculean blue or Pompeian blue), common along the banks of the Nile (but also in Crete and in Mesopotamia) for thousands and thousands of years and considered one of the first synthetic pigments. This pigment is obtained prevalently by mixing variable quantities of quartz or siliceous sands (SiO_2) with calcium and copper carbonates. According to some sources, the Egyptians used mainly copper - or minerals containing copper, like malachite – with crushed quartz together with limestone rocks or desert sand. All these ingredients were ground, mixed with water and baked in an oven, sometimes three times, for a total of around 100 hours of baking!

Another pigment used in ancient times for blue tones was azurite, a basic copper carbonate. Originally used above all in the Orient – in Central and Western China, in Japan and in ancient Egypt – azurite became important in Medieval and Renaissance European painting too. This pigment was the main replacement of another blue pigment used by European painters from Medieval times: ultramarine, which was however extremely costly. In fact, it was obtained from lapis lazuli,

a well-known semi-precious stone, mainly imported from Afghanistan. One of the best-known cycles of frescoes in which ultramarine was extensively used is certainly that of the Scrovegni Chapel in Padua, painted by Giotto in the early 1300s.



The vault of the Scrovegni Chapel (ource Wikipedia)

Yellow

Of the yellows used in the history of art, Indian yellow is certainly one of those with the most original source. Developed in Asia in the 5th century AD, it was obtained from a mixture containing cow urine. Caution, however: in order to produce sufficiently yellow urine, the cows needed to be fed on a specific diet, based on... mangoes! Even though it certainly could not claim a noble origin like that of ultramarine blue, Indian yellow had a series of characteristics that were of great interest to artists and their patrons: it had a very deep tone and was very stable, even when exposed to direct light. This is why it was widely used, both for oil painting and for watercolours, but it was prohibited at the beginning of the 20th century.

One of the oldest stories on yellow pigments is certainly that of orpiment, derived from a mineral. More specifically, orpiment is an arsenic sulphide found mainly in hydrothermal veins, hot springs and in volcanic fumaroles. The use of this mineral as a pigment was in vogue from ancient times and its characteristics were already known to the Ancient Greeks, Persians, Chinese and Egyptians. Mentioned in several sources, including Plinius and Vitruvius, and found in numerous works, this mineral, which during the Renaissance came prevalently from Asia Minor, was used as a pigment up to the 20th century due to its opacity and its luminous characteristics. Some considered it to be very similar to gold, as moreover is indicated by its etymology: in Latin "auripigmentum" in fact means "gold-coloured pigment".



Orpiment

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