Cinnabar: ‘A beautifully red stoney substance that breaks into shining bright, angular pieces’[1]

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CINNABAR IS A naturally occurring mineral with the composition mercury(II) sulfide. It is a beautiful colour – a deep, slightly pink, red, the same shade as a ruby. However unlike rubies, cinnabar is soft – it can be scratched with a fingernail – which renders it useless as a gem stone. Cinnabar is not particularly common but it is abundant in many of the localities in which it occurs. It is most commonly encountered in two main geological environments: in association with the mineralization of gold veins and as a product of volcanically driven geothermal activity; therefore it is found in the vicinity of certain hot springs. More often than not, cinnabar occurs as earthy masses and is often associated with native mercury, quicksilver, which bleeds out of the host rock. In some instances, as in the image here, cinnabar forms relatively large, well-developed, transparent crystals. This example is in association with the mineral dolomite and comes from Hunan Province in China.

Despite cinnabar’s inadequacy as a gem, its beautiful colour remains desirable. The softness of this mineral means that it is easily pulverized, and remarkably, it retains its intense colour when finely ground. Therefore it has been prized as a pigment which, when mixed with a medium, produces an intense red paint. Notwithstanding the risks of mercury poisoning, cinnabar-based paints have been valued by almost every global culture.

Earliest uses of cinnabar as a pigment are in the Neolithic wall-paintings of Çatalhöyük in central Anatolia. In China this pigment is known to have been in use from the second millenium BC, identified on oracle bones. To the Romans, cinnabar obtained from the mines of Almaden in Spain was one of the most valuable commodities. Prices were capped by law at 70 sesterces a pound to stop costs spiraling out of all proportion. At over ten times the price for a high-quality red ochre, cinnabar was a symbol of wealth and taste. This is the colour that gave us the phrase ‘red letter day’ from the Romans’ use of cinnabar to write important dates on calendars and inscriptions.

During the European Renaissance, the value of cinnabar was second only to that of blue pigment ultramarine. It was used to paint the robes of cardinals and those of the Madonna. The technique of manufacturing this compound from mercury and sulphur had been developed and this synthetic form of mercury(II) sulfide goes by the name of ‘vermillion’. The natural and synthetic forms are difficult to differentiate, but both produce a strong, dense and beautiful red.

However cinnabar and vermillion are not the perfect reds. Some forms of cinnabar turn black when exposed to light. The exact mechanisms for this remain obscure; however it is likely to be related to trace amounts of chlorine in the crystal structure. Nevertheless this unfortunate property was described by the Roman architect Vitruvius in the first century BC and it is a little known fact that the vaults of many of Europe’s art galleries contain portraits of cardinals, no longer fit for display, because their beautiful red robes have now turned an unsightly black.

1. H. Boerhaave, *Elementa Chemiae* (Leiden, 1732).

Cinnabar on dolomite
Hunan Province, China
Length 8 cm
UCL Geology Collections