

MICROSCOPICAL EXPLORATION TWENTY TWO

POLARISED LIGHT MICROSCOPY USING FOUR DIFFERENT LIGHT SOURCES

When I refer to *different* light sources what I mean is sources with different colour temperatures. I do not propose to provide a detailed explanation of what colour temperature is/means other than to refer the reader to the Wiki:

https://en.wikipedia.org/wiki/Color_temperature

or this excellent article from OLYMPUS, also on the web:

<https://www.olympus-lifescience.com/en/microscope-resource/primer/photomicrography/colortemperature/>

My old Vickers M10A microscope, dating from 1985, is fitted with 6volt 18watt tungsten filament illumination which emits light with a colour temperature of, I estimate, 2000 - 2400K due, probably, to the age and infirmity of the bulb. The microscope can also be fitted with a plane mirror to facilitate the use of external sources of illumination. The external sources used in this exploration were as follows:

470 lumen warm white LED lamp with colour temperature of 3000K

470 lumen daylight LED lamp with colour temperature of 6500K

Natural daylight (overcast) from the Northwest facing window of my man-cave (generally accepted as being \approx 7000-7500K).

For the observations a specimen slide of Tartaric acid was made by evaporation of 250 μ L of a 100mg/ml solution in industrial methylated spirit on a clean glass slide. A polarising filter was mounted on the top of the sub-stage condenser and an analysing filter positioned in the body tube of the microscope above the objective turret. A plane glass stage plate was positioned centrally on the microscope stage to enable the placement of a waveplate between the polariser and the specimen slide

The microscope was fitted with a Brunel Eyecam Plus eyepiece camera and images were captured using Swift Imaging 3.0 software. Observations were made between both crossed and parallel polars at the various illumination colour temperatures, and are shown below:

CROSSED POLARS

Tungsten Filament 2000-2400K



3000K



6500K



Natural Daylight



PARALLEL POLARS

Tungsten Filament 2000-2400K



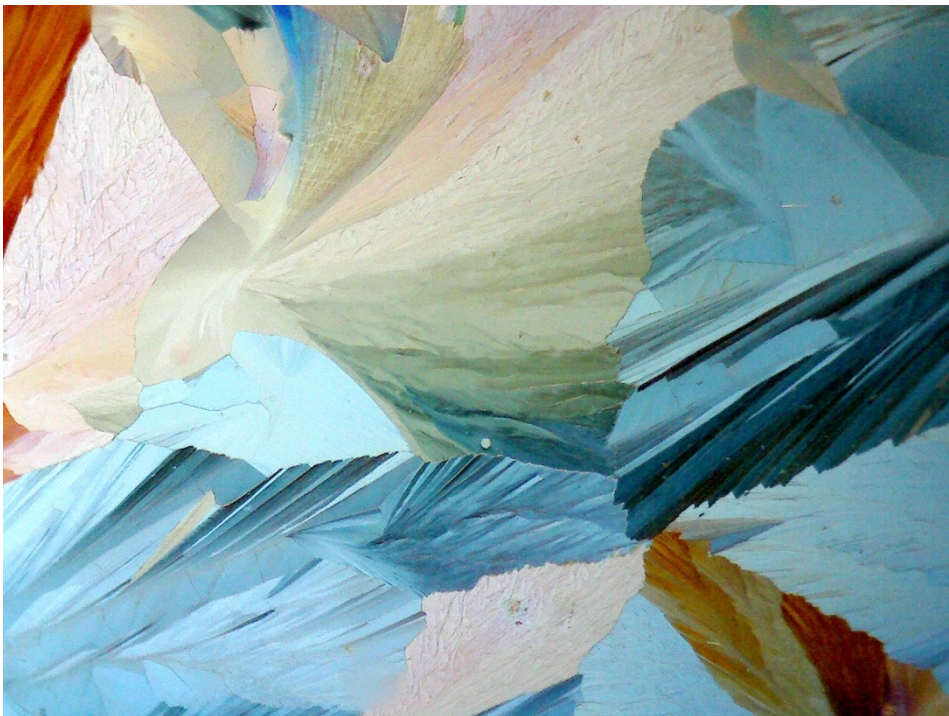
3000K



6500K



Natural Daylight



The observations were repeated with a sticky tape waveplate positioned between the polarising filter and the specimen slide and are shown below:

CROSSED POLARS WITH WAVEPLATE

Tungsten Filament 2000-2400K



3000K



6500K



Natural Daylight



PARALLEL POLARS WITH WAVEPLATE

Tungsten Filament 2000-2400K



3000K



6500K



Natural Daylight



In Conclusion

Whilst the differences generated by the various illumination colour temperatures might appear to be subtle, they are noticeable. Colour temperature, therefore, I consider to be another useful tool to be retained in my amateur microscopist's toolbox.

As we say here in Cumbria:

'Ave a go yersel'!

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