MICROSCOPICAL EXPLORATION NUMBER TWO

WART TREATMENT AND WAVEPLATES

James R Stewart Cumbria United Kingdom

Introduction

Since my first exploration, of cold relief capsules, Santa has been very kind and has given me a new Apex Practitioner microscope. Time for another visit to the high street! This time I hunted down Wart Treatment Gel (with a name that sounds like a shoulder held anti-tank rocket launcher: you know the one!), which contains Salicylic acid and Lactic acid. Then I went for unbranded transparent sticky tape from the pound shop. I already had acetone free nail polish remover from my previous exploration, so now I was good to go!

What Was Done

i) To prepare a specimen slide for observation:

Firstly, twenty millilitres of the nail polish remover were measured into a small lidded glass jar (same kind as in the previous exploration: see Micscape magazine, Jan 2020).
To the jar were then added approximately twenty drops (one millilitre) of the wart treatment gel. The lid was replaced, the jar was shaken and the contents were allowed to homogenise for about half an hour. The resulting clear solution was then ready for use.
Three drops of the clear solution were placed on a clean glass slide and allowed to evaporate at room temperature.

ii) To prepare a series of ‘sticky tape waveplates’:

To each of twenty clean glass microscope slides were applied a number (from one up to five in total) of layers of sticky tape, in various orientations to each other on both the upper and lower surfaces of the slide. There is little point in describing in detail the construction of each of the twenty waveplates because, “ There are more variables in Heaven and Earth, Horatio, than are dreamt of in thy philosophy”. Sorry Mr Shakespeare!!
That is to say, the sticky tape may be stretched differently as it is applied and the orientation of each layer may not be exactly reproducible or the wind may be blowing in the wrong direction (Ha,Ha,). Suffice it to say that each of the waveplates is different to all the others and that the number of different combinations possible is huge.

iii) The crystals on the slide were then viewed using my new Apex Practitioner microscope with a x4 objective and Brunel Eyecam Plus eyepiece camera in place of the ocular. The microscope is fitted with a mechanical stage which allows the specimen slide to be held in position while the 'sticky tape waveplates' are interposed in the light path between the specimen slide being observed and the objective lens, ie. placed on top of the specimen slide without moving it.

The image 'nonpolarised' in the Observations section below shows the image captured using conventional sub-stage LED illumination.

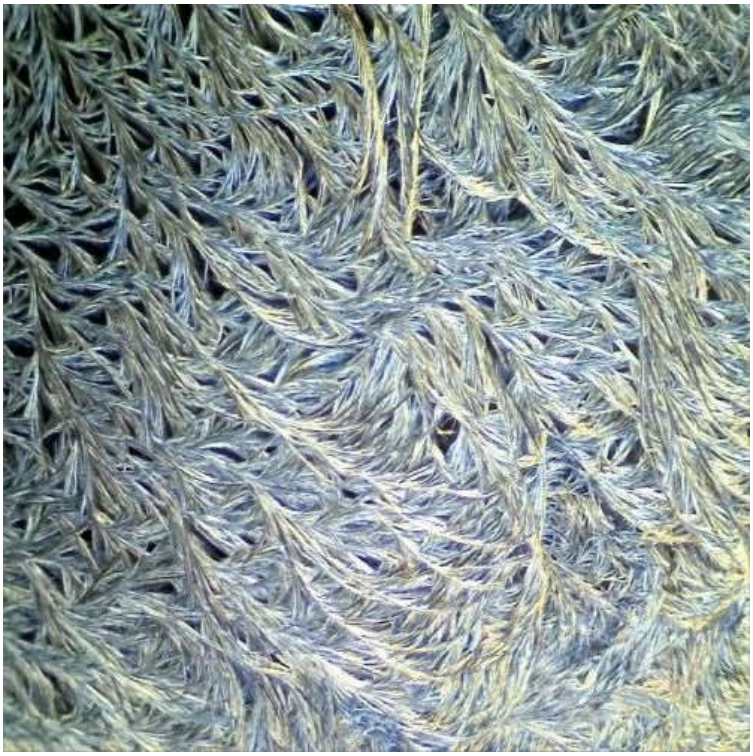
A homemade polarising filter was then inserted immediately above the microscope sub-stage illuminator and a similarly homemade analyser was positioned in the body tube above the microscope objective.

Image 'polarised' shows the resulting image of the same area of the slide using polarised light.

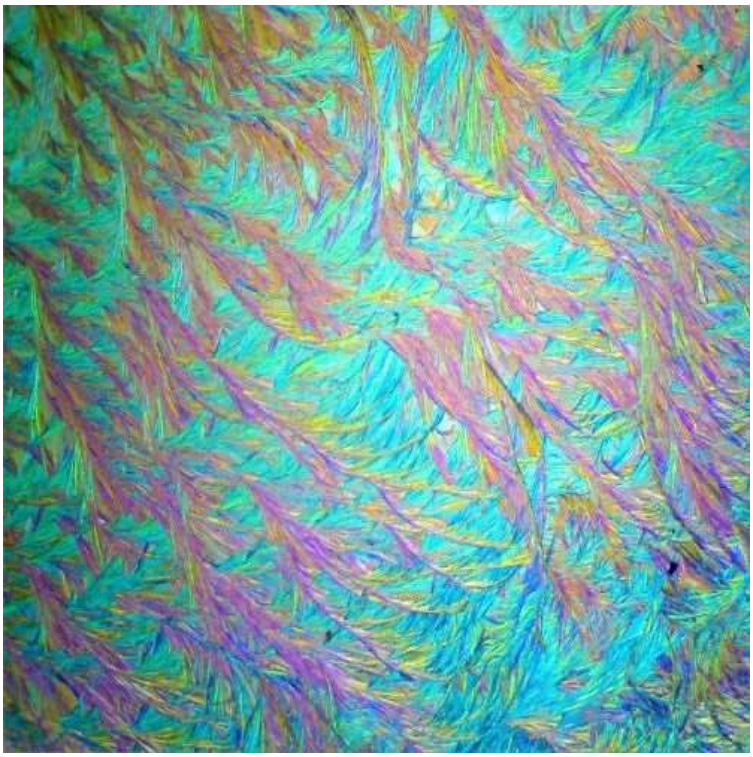
Each of the twenty 'sticky tape waveplates' was then interposed, one at a time, as explained above. The images 'waveplate1' – 'waveplate20' were captured to illustrate the differences in the effect of each waveplate.

Observations

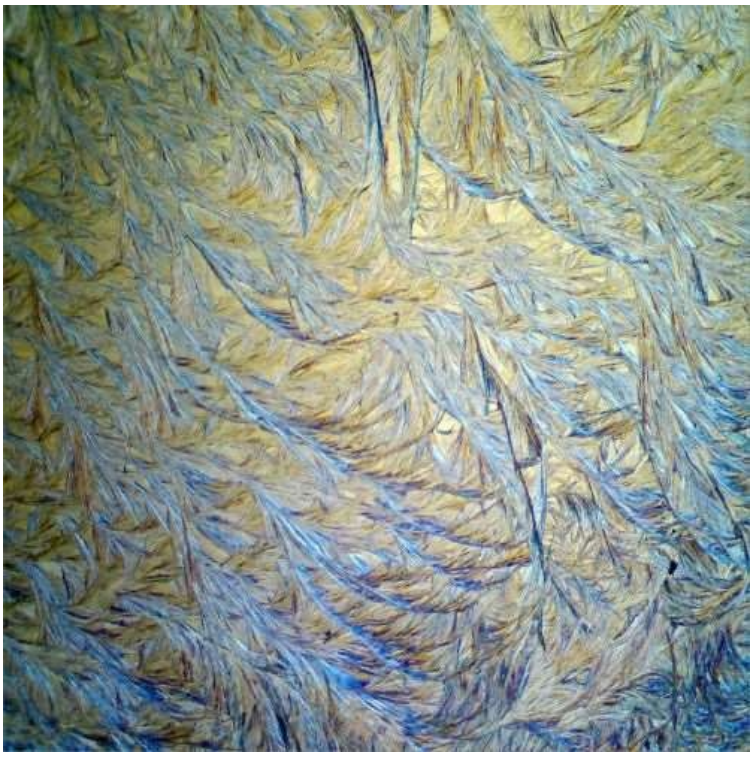
Non-polarised



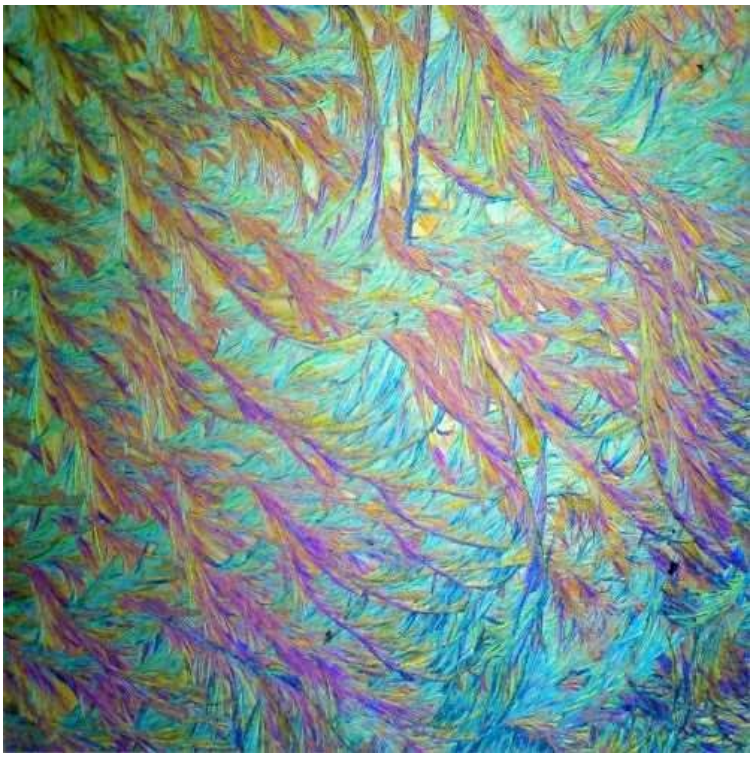
Polarised



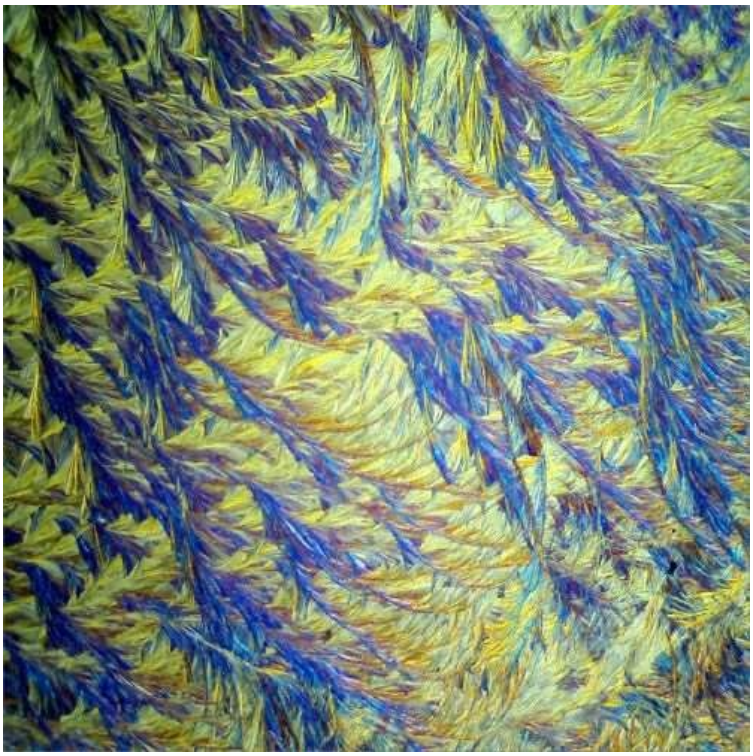
Waveplate1



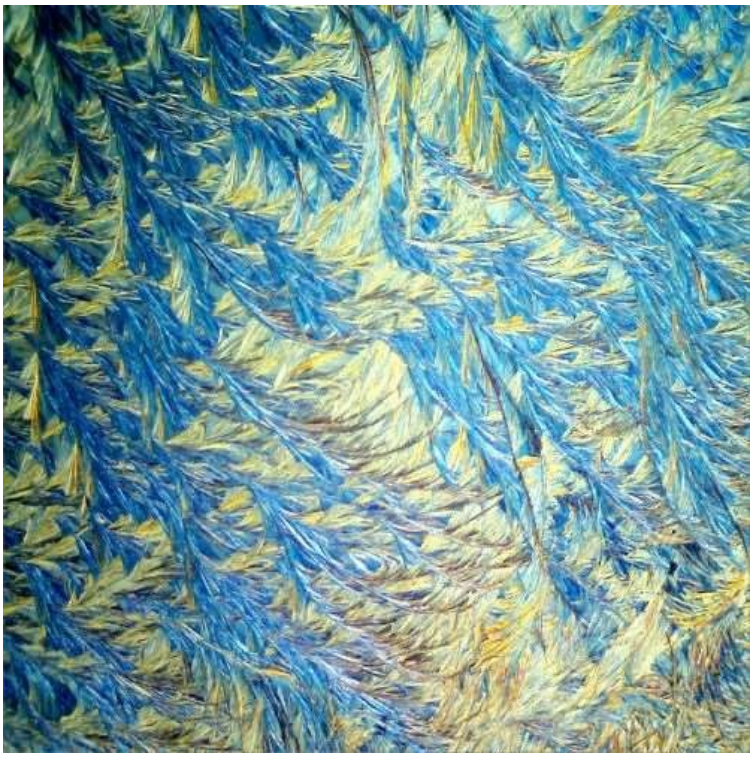
Waveplate2



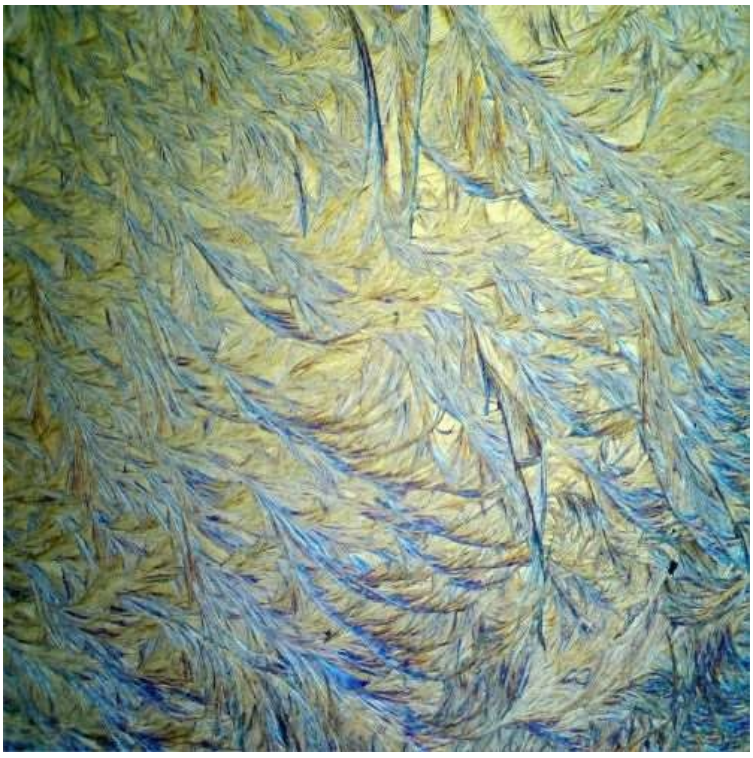
Waveplate3



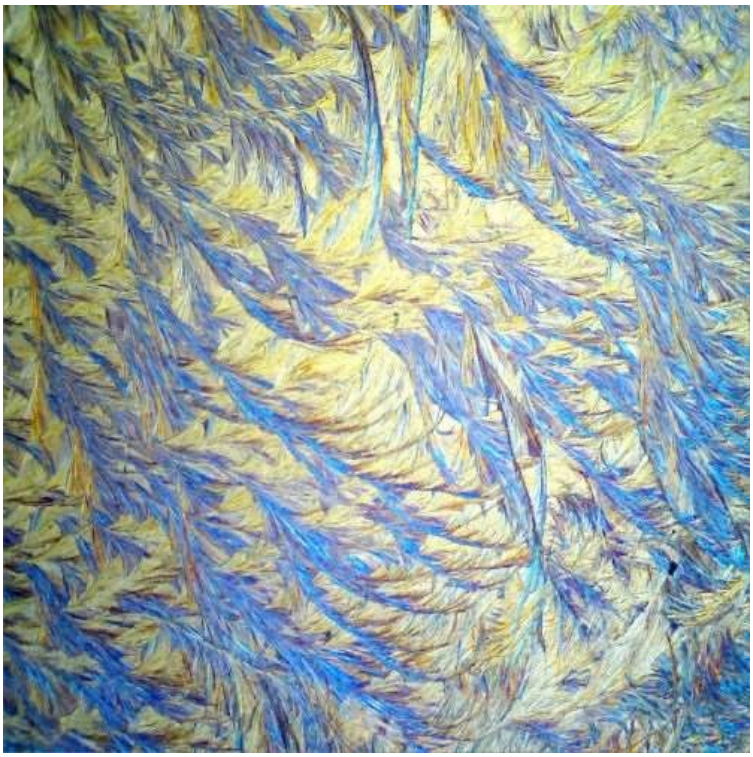
Waveplate4



Waveplate5

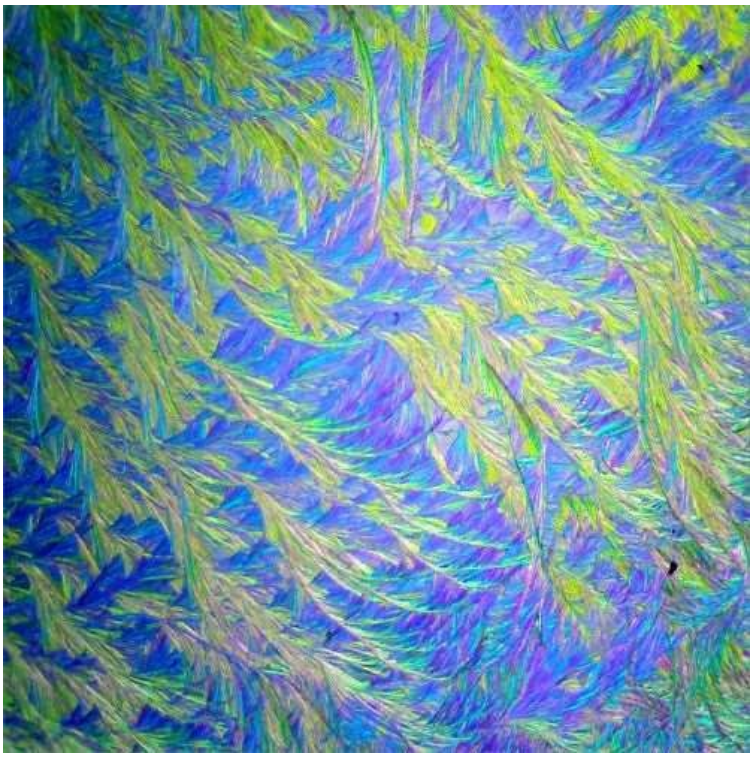


Waveplate6

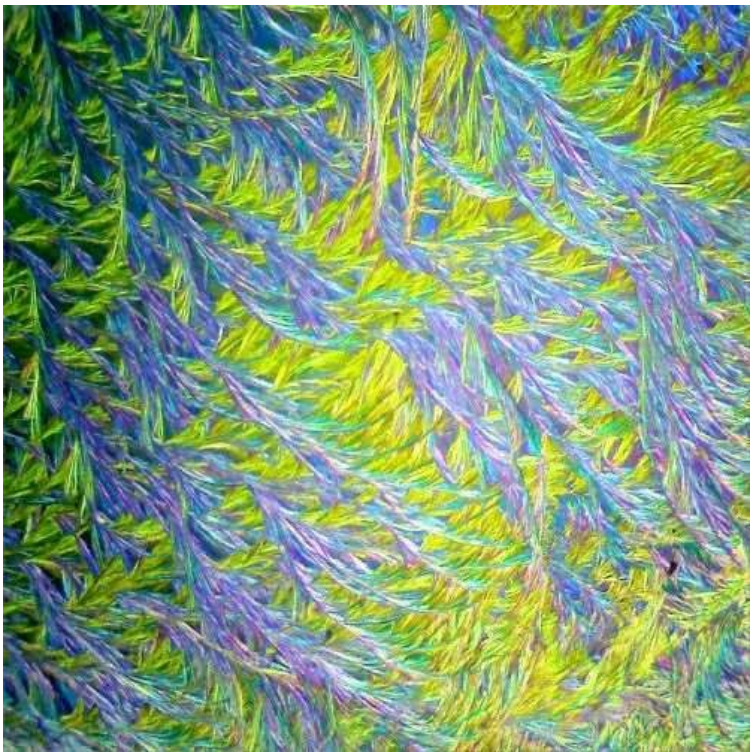


Waveplate7

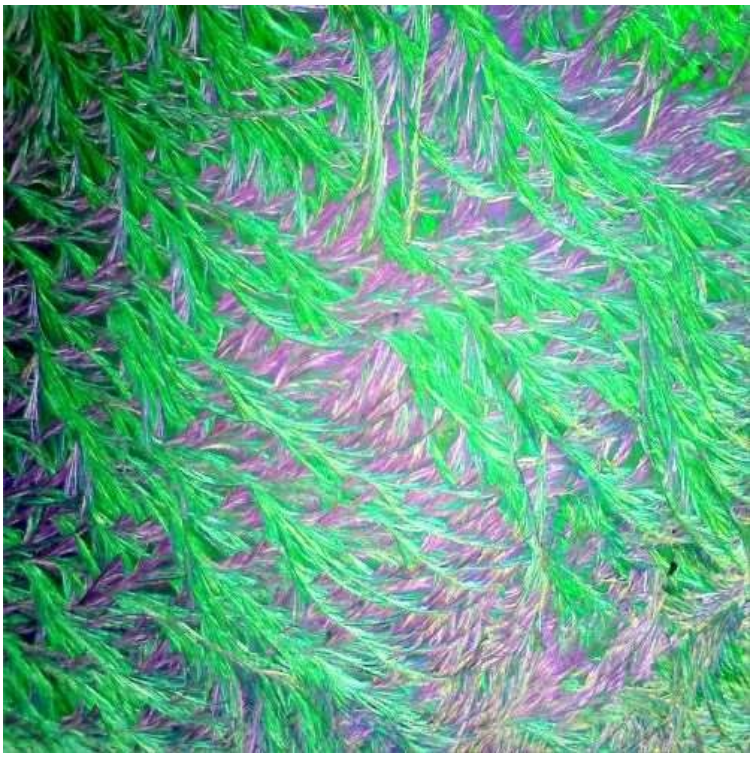
Waveplate8



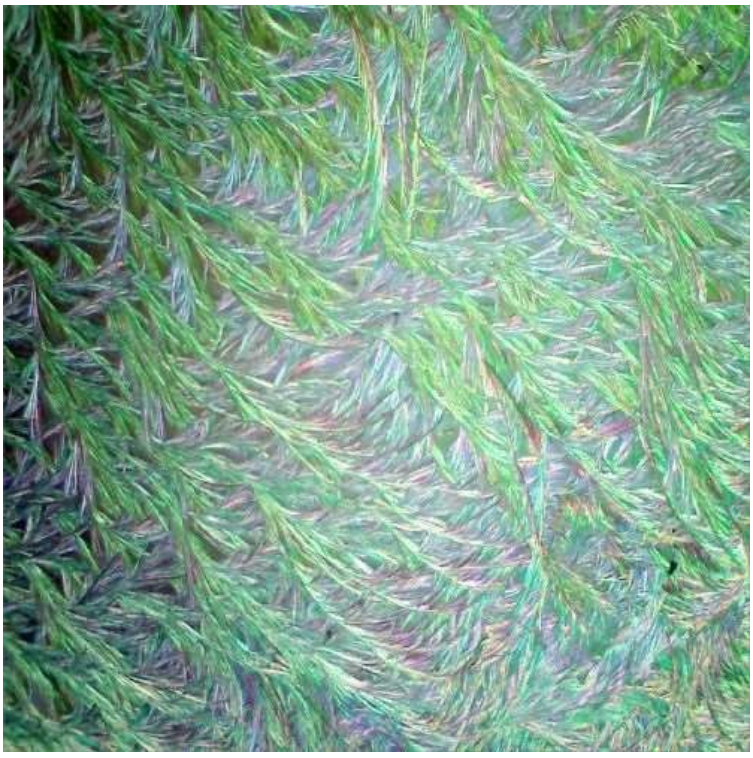
Waveplate9



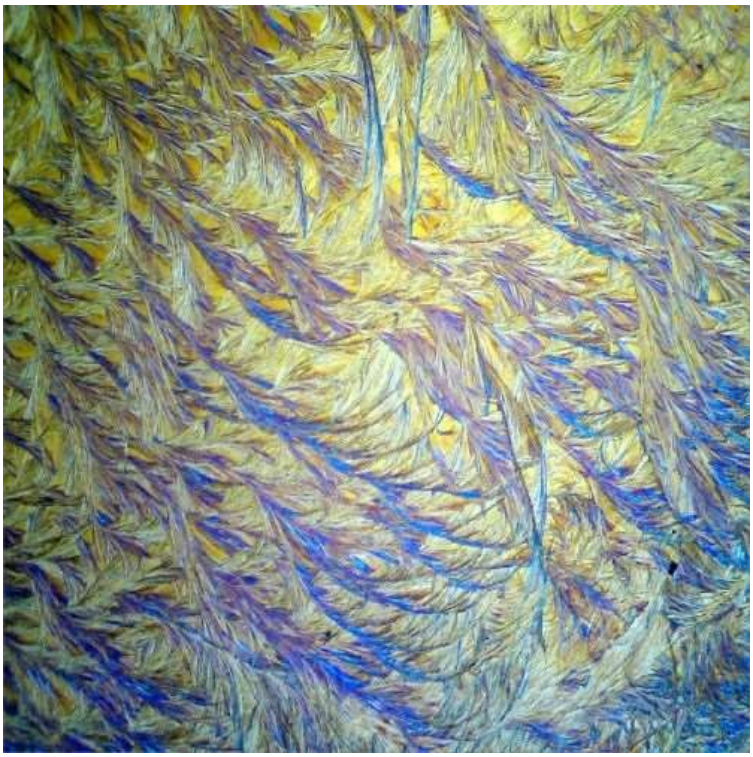
Waveplate10



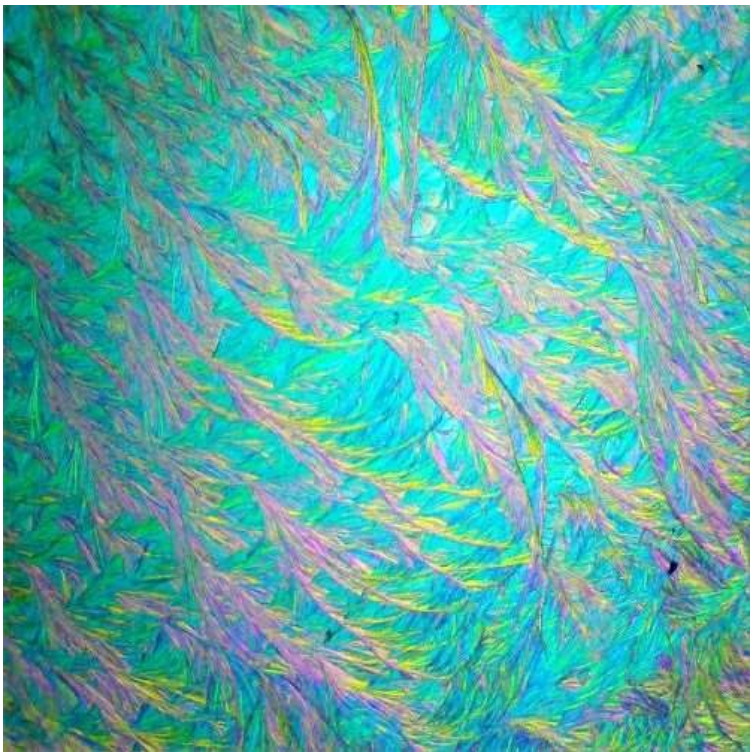
Waveplate11



Waveplate12

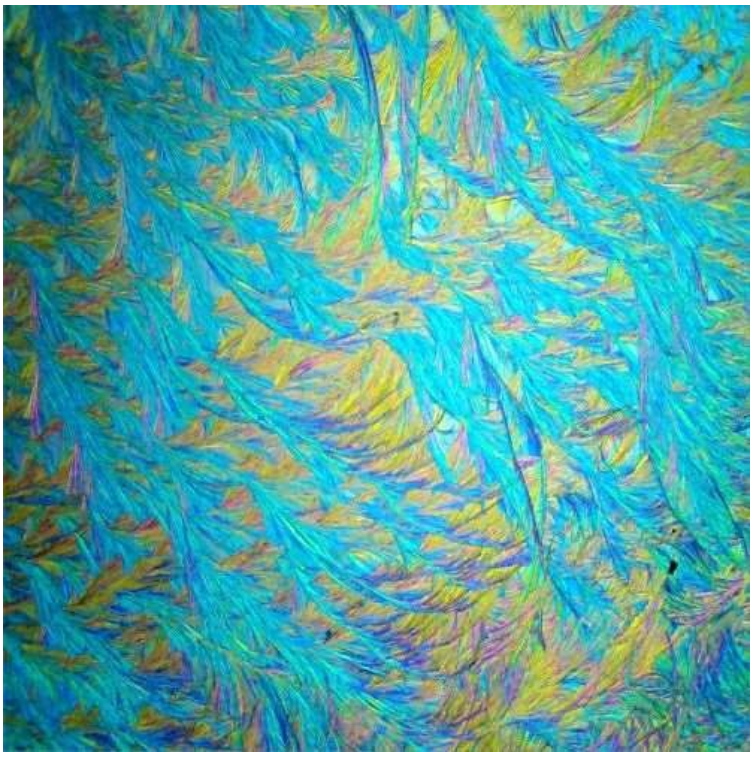


Waveplate13

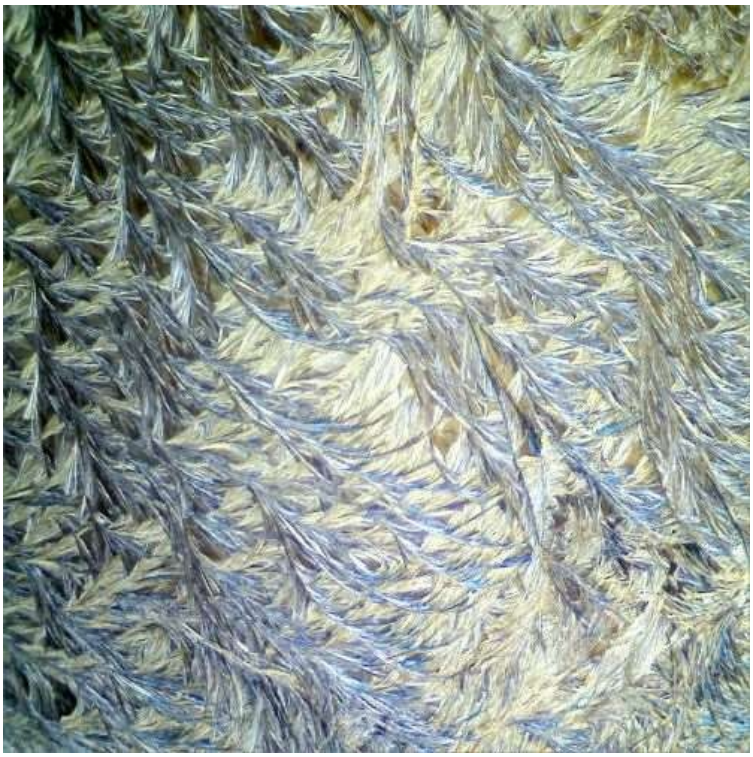


Waveplate14

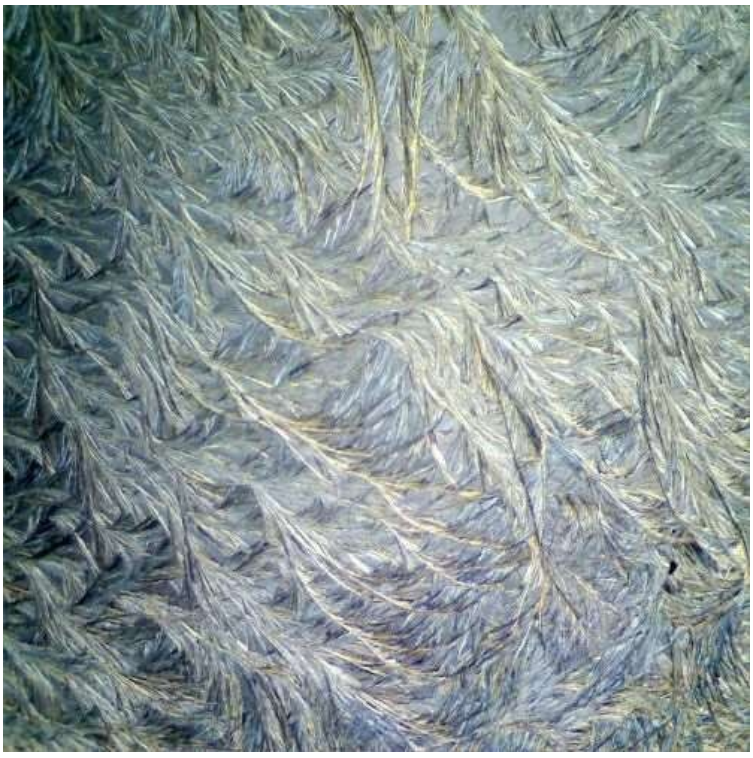
Waveplate15



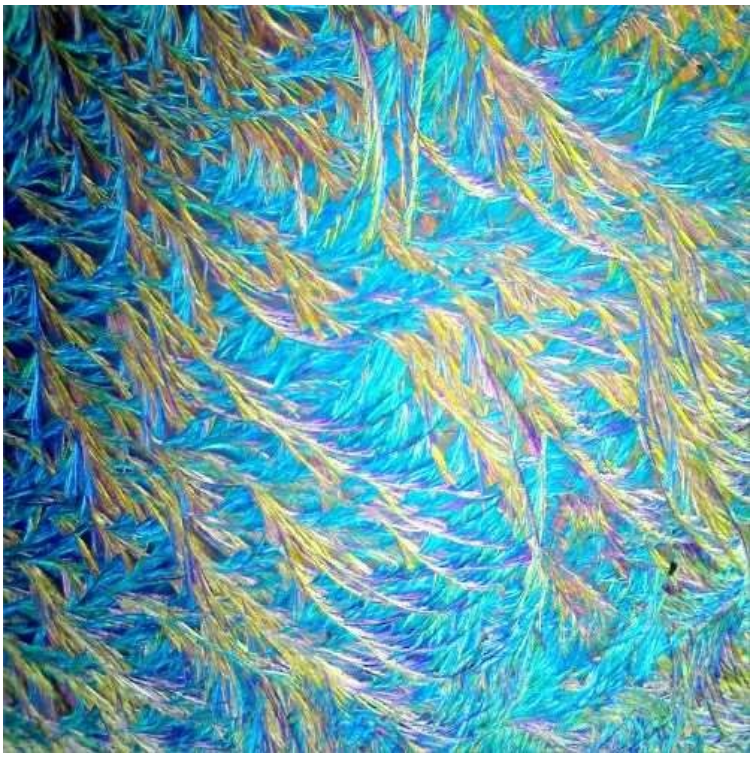
Waveplate16



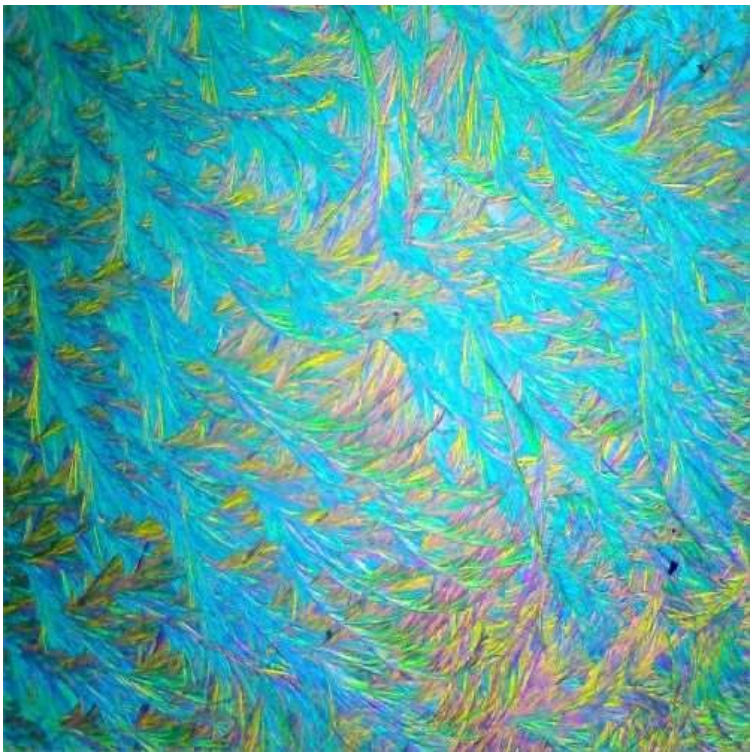
Waveplate17



Waveplate18



Waveplate19



Waveplate20

In Conclusion

The theory of waveplates is very complicated, and to some almost incomprehensible: https://en.wikipedia.org/wiki/Waveplate refers. However, an in-depth understanding of how they work is not required for this exploration, just a basic knowledge of how to use them is enough. The pleasure to be gained from the observation of such images produced using easily accessible everyday materials, for the amateur microscopist, is immense.
N.B. The slight darkening on the left of the images is due to my incorrect adjustment of the sub-stage iris/condenser assembly: I'm still learning how to work my new-fangled modern instrument.

Hints for further exploration: Adjustment of the orientation of the waveplate, in the horizontal plane, gives rise to noticeable differences in colour and resolution of the image, and is worthy of further investigation.
Does branded sticky tape work as well as the 'cheapo' stuff that was used above?

As we say here in Cumbria,

"AVE A GO YERSELF"

James Stewart

Comments to the author are welcomed,
email - stewartr178 AT yahoo DOT co DOT uk

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