MICROSCOPICAL EXPLORATION EIGHTEEN

FRUIT ACIDS IN FOCUS

Introduction

One of the organic acids naturally occurring in fruit, ascorbic acid, has been widely documented in past issues of Micscape magazine and will not be considered in this article. There are, however, three other fruit acids, easily accessible as crystals of their pure form, which will be the subjects this Microscopical Exploration 18. These are:

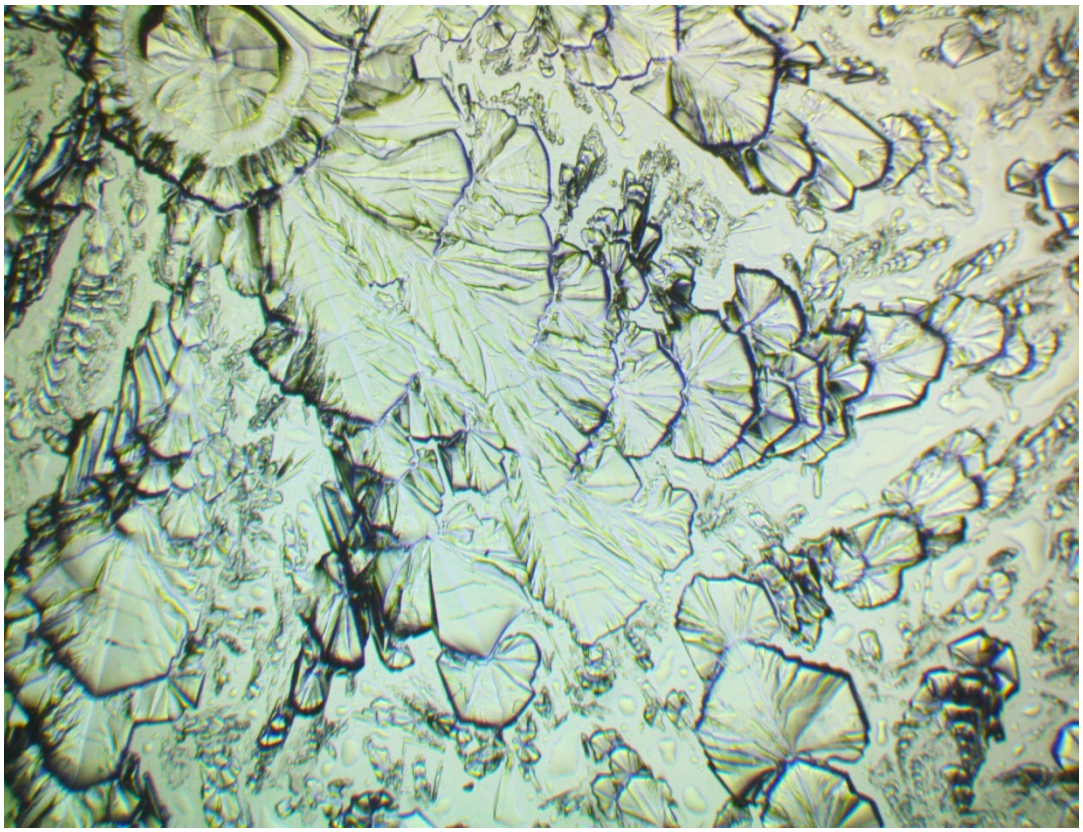
Common Name	Formula
Citric acid	$C_6H_8O_7$
Malic acid	$C_4H_6O_5$
Tartaric acid	$C_4H_6O_6$

The table above lists the acids in their order of abundance in almost all fruit, with citric being the most abundant. There is, however, one exceptional fruit, with tartaric acid being more abundant than the other two in grapes. Coincidentally they also appear above in alphabetical order and will be considered thus in this article.

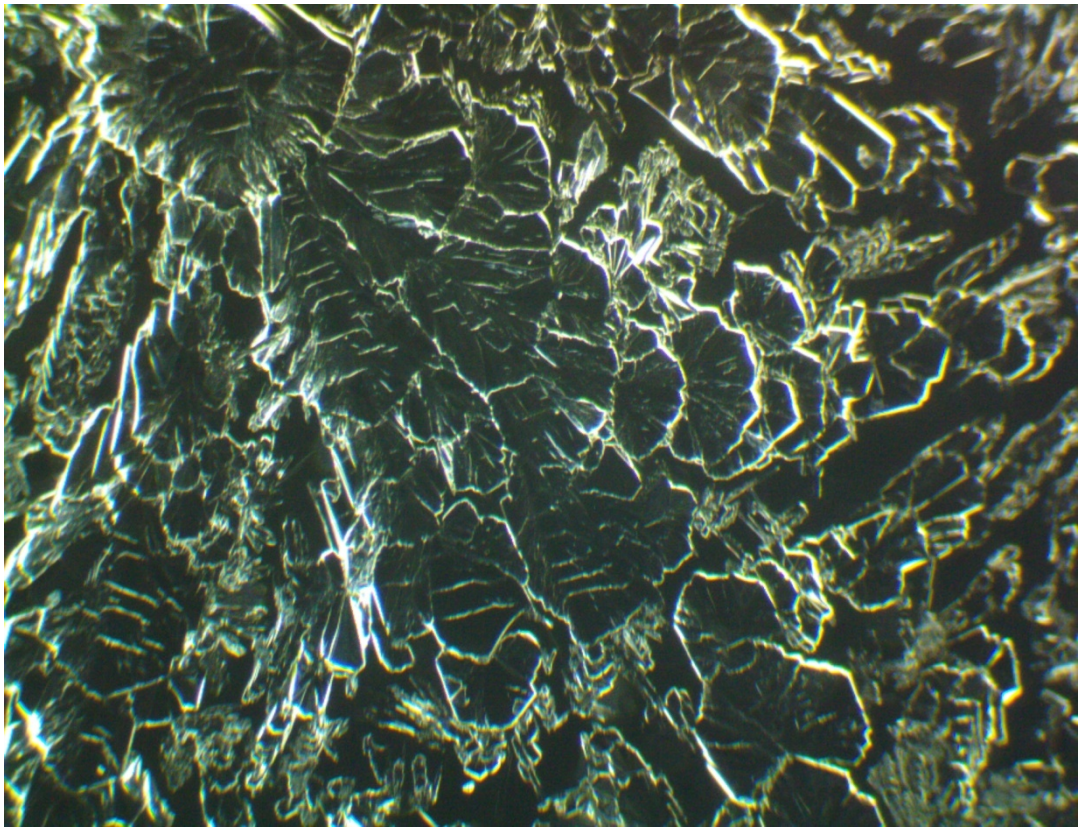
Procedure

I prepared separate solutions of each of the acids by dissolving 1.0 grams of the pure crystals in 10 millilitres of a 50/50 mixture of industrial methylated spirit and acetone. This resulted in a 10%w/v (100mg/ml) solution of each of the acids. I then placed two drops of each solution on separate clean microscope slides and evaporated to dryness by means of an electric hairdryer on its low heat setting. I observed the resulting crystals of the three acids using the x4 objective on my Swift SW380T microscope which is fitted with a Swiftcam SC1003 microscope digital camera, and captured the following images at 1792x1372 pixels with Swift Imaging 3.0 software.

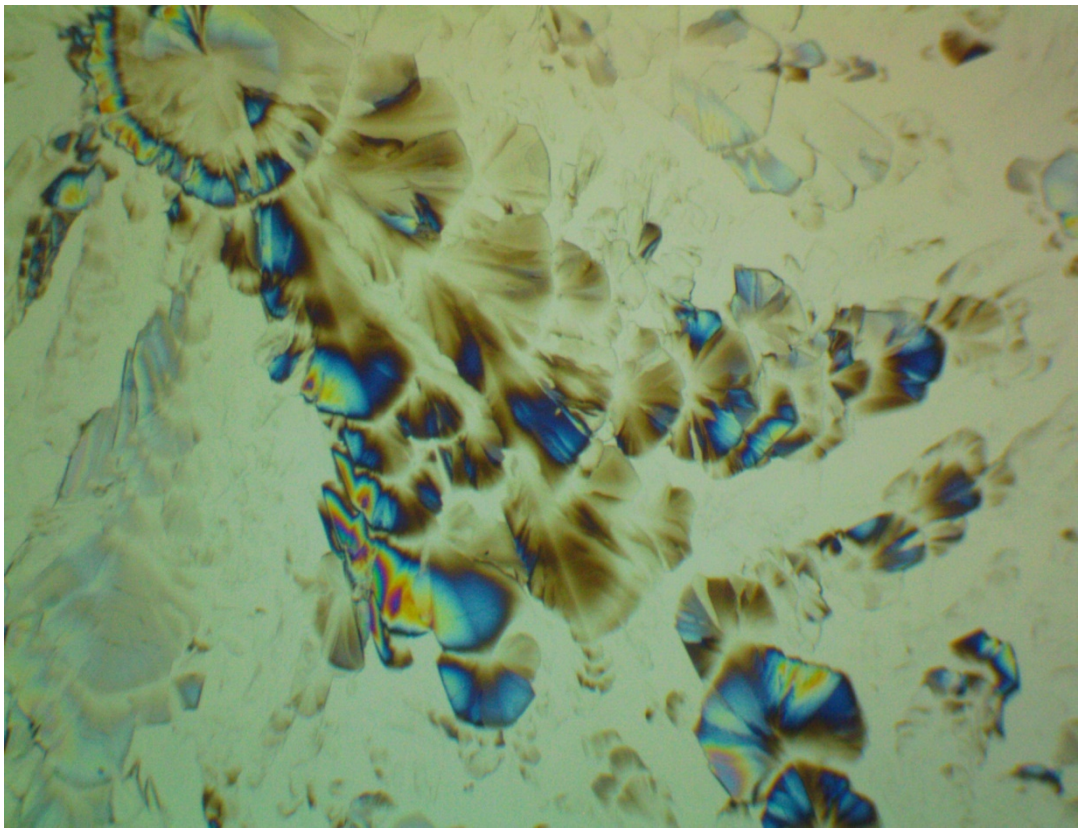
Citric acid brightfield



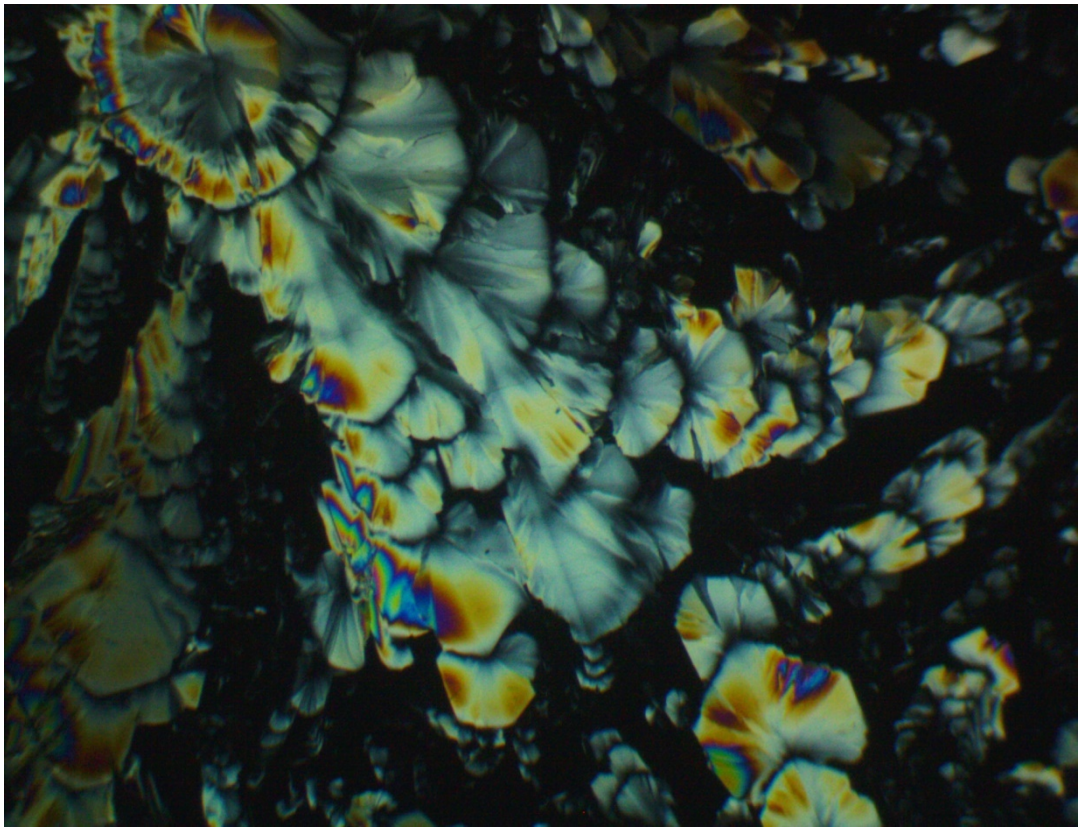
Citric acid darkfield



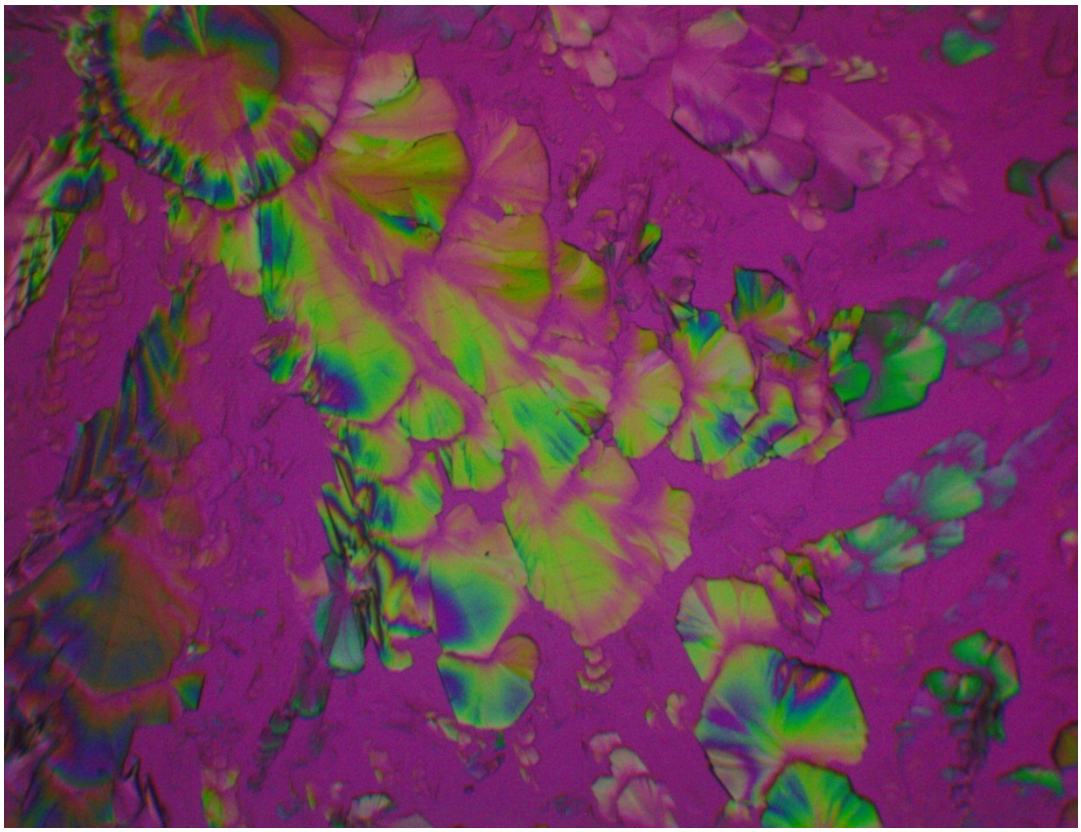
Citric acid between parallel polarisers



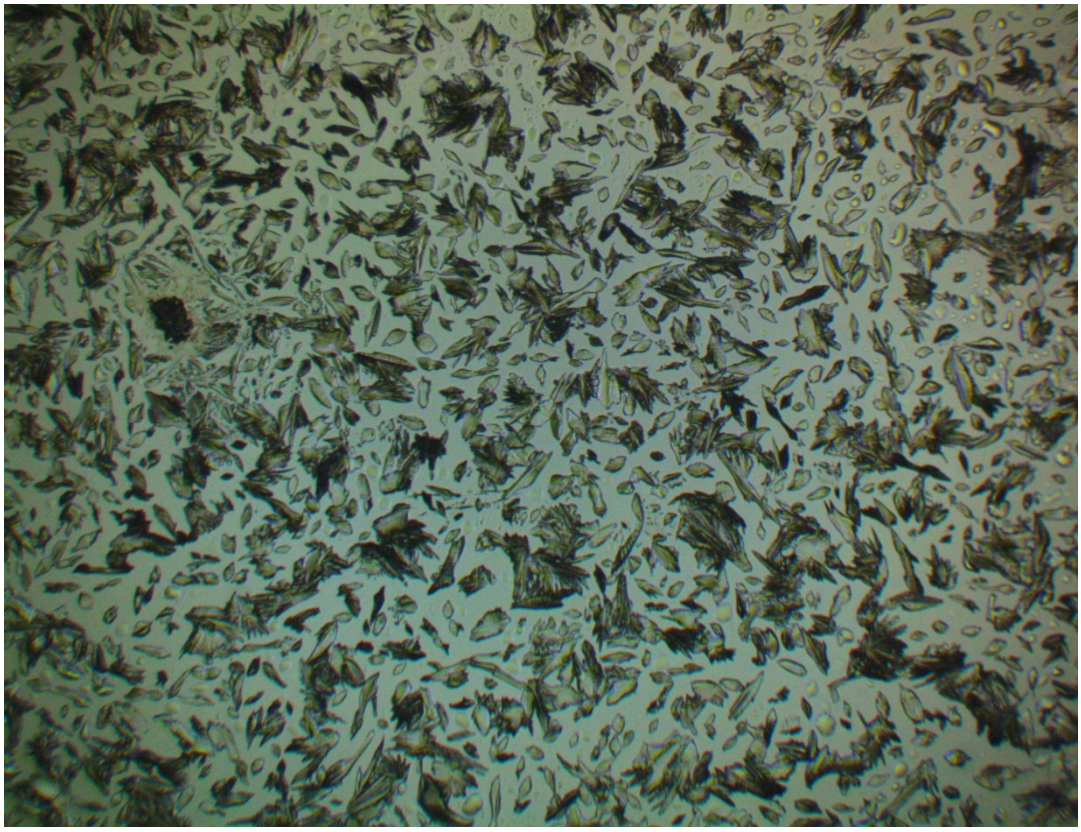
Citric acid between crossed polarisers



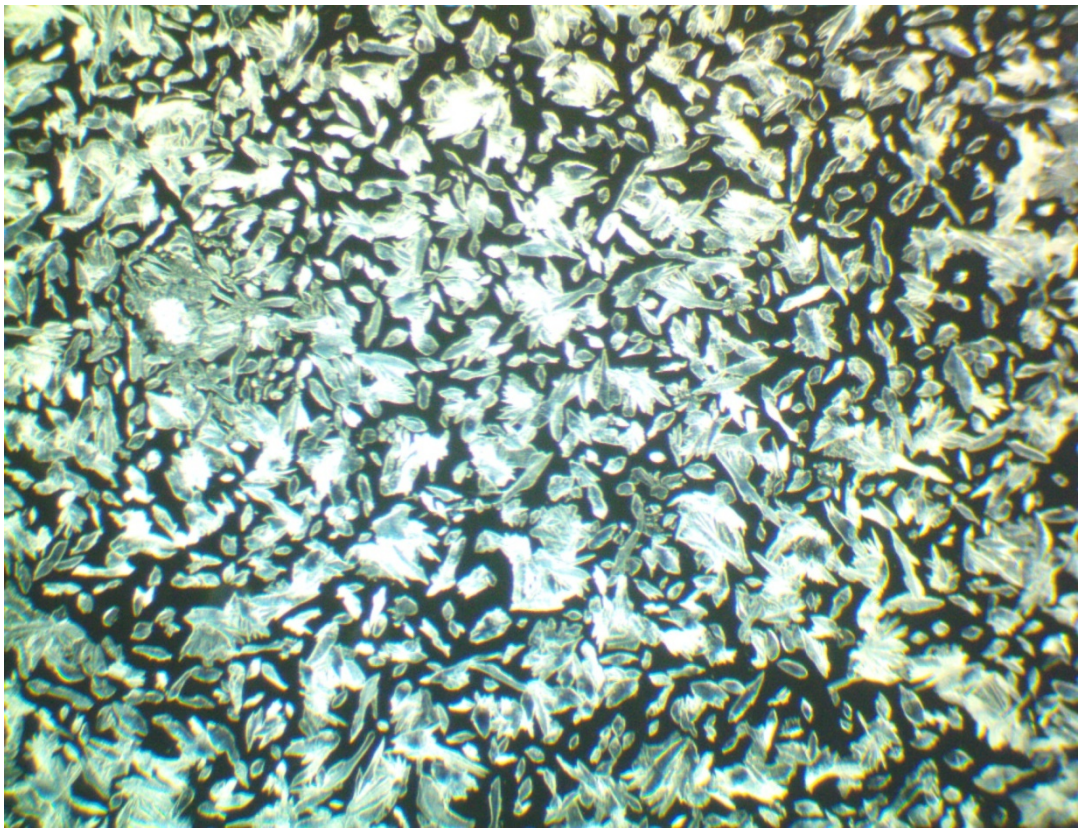
Citric acid between crossed polarisers with sticky tape waveplate



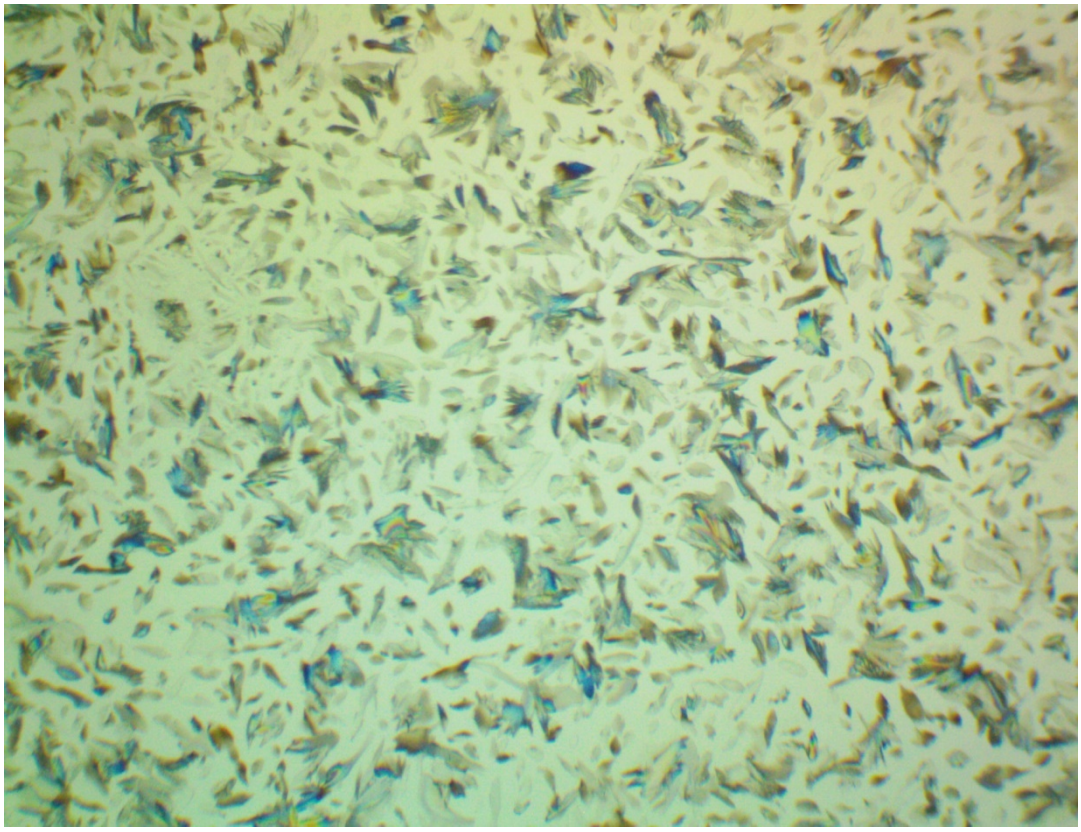
Malic acid brightfield



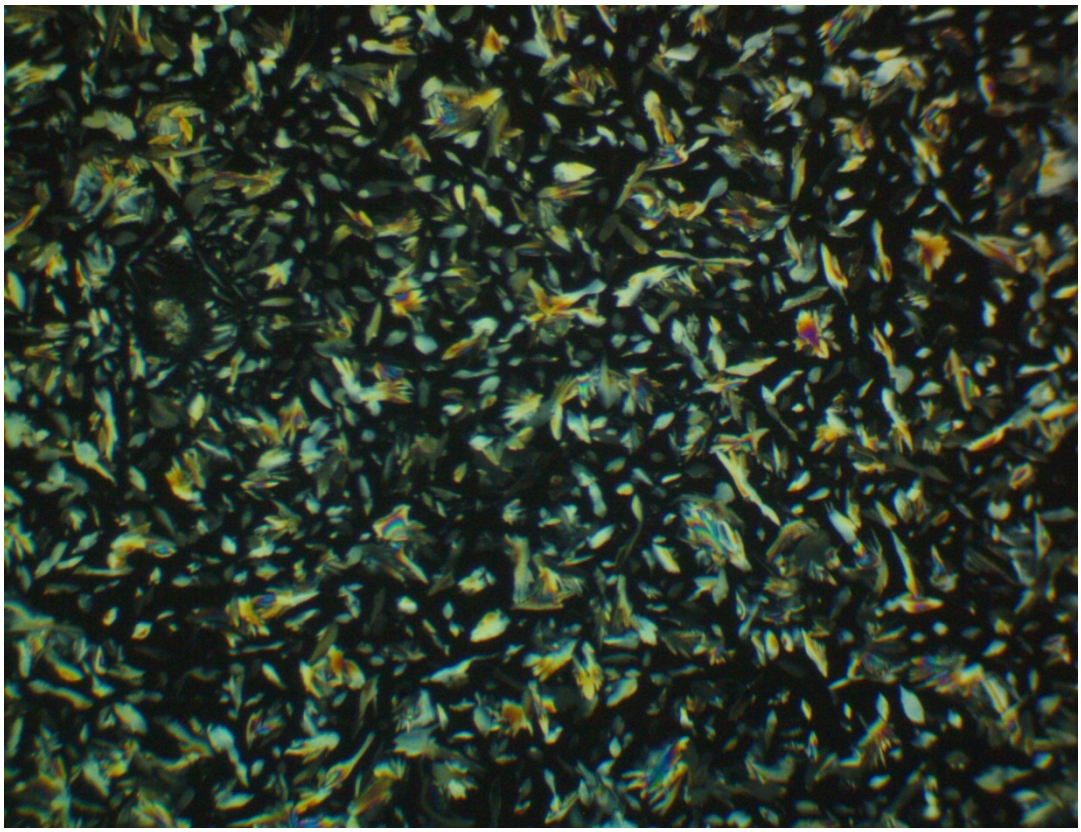
Malic acid darkfield



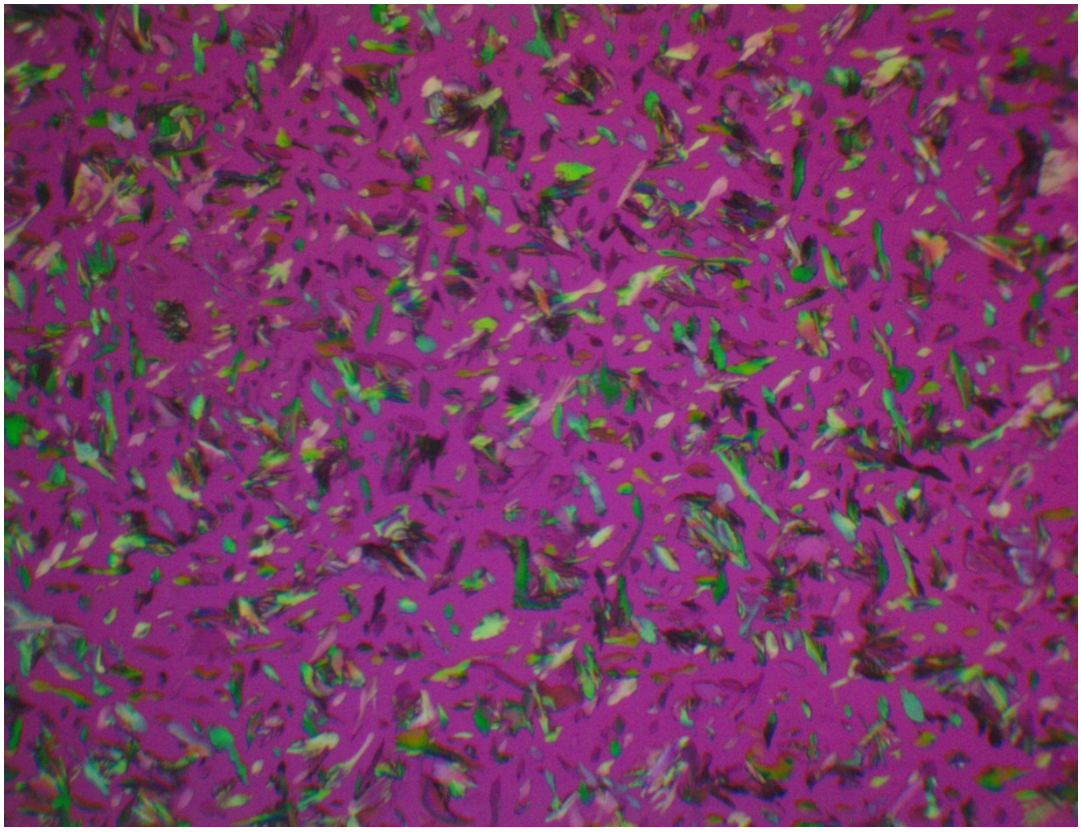
Malic acid between parallel polarisers



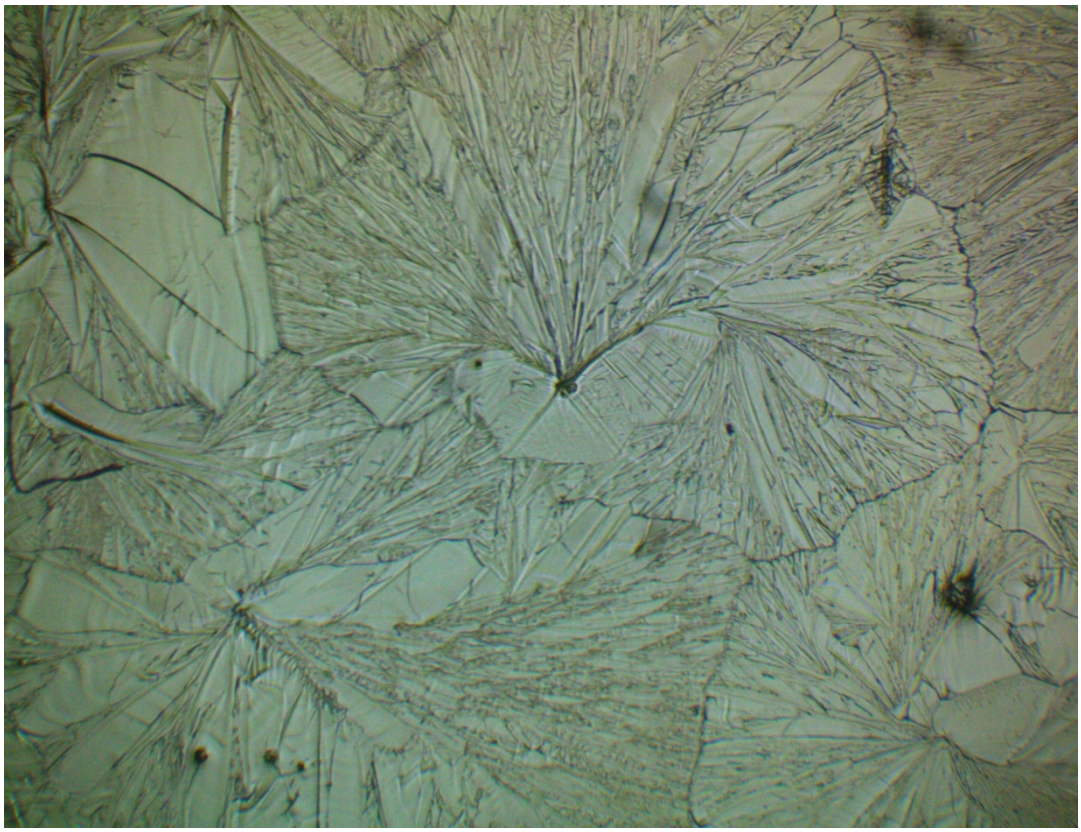
Malic acid between crossed polarisers



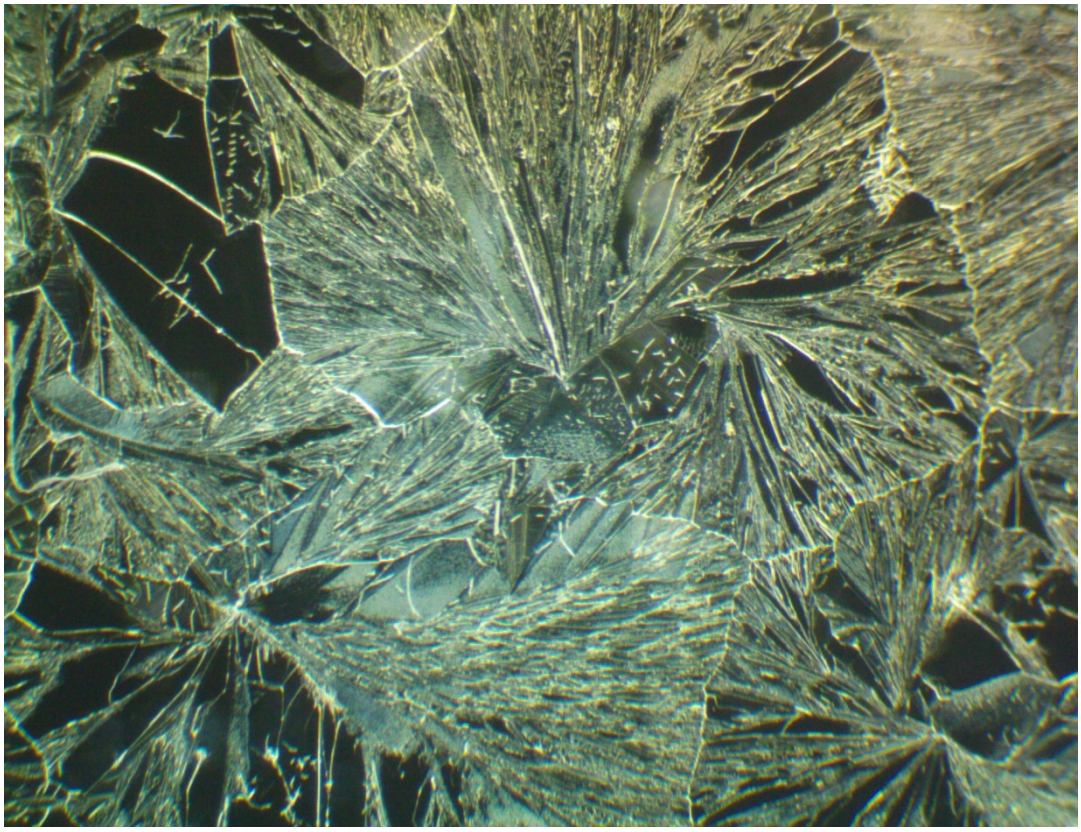
Malic acid between crossed polarisers with sticky tape waveplate



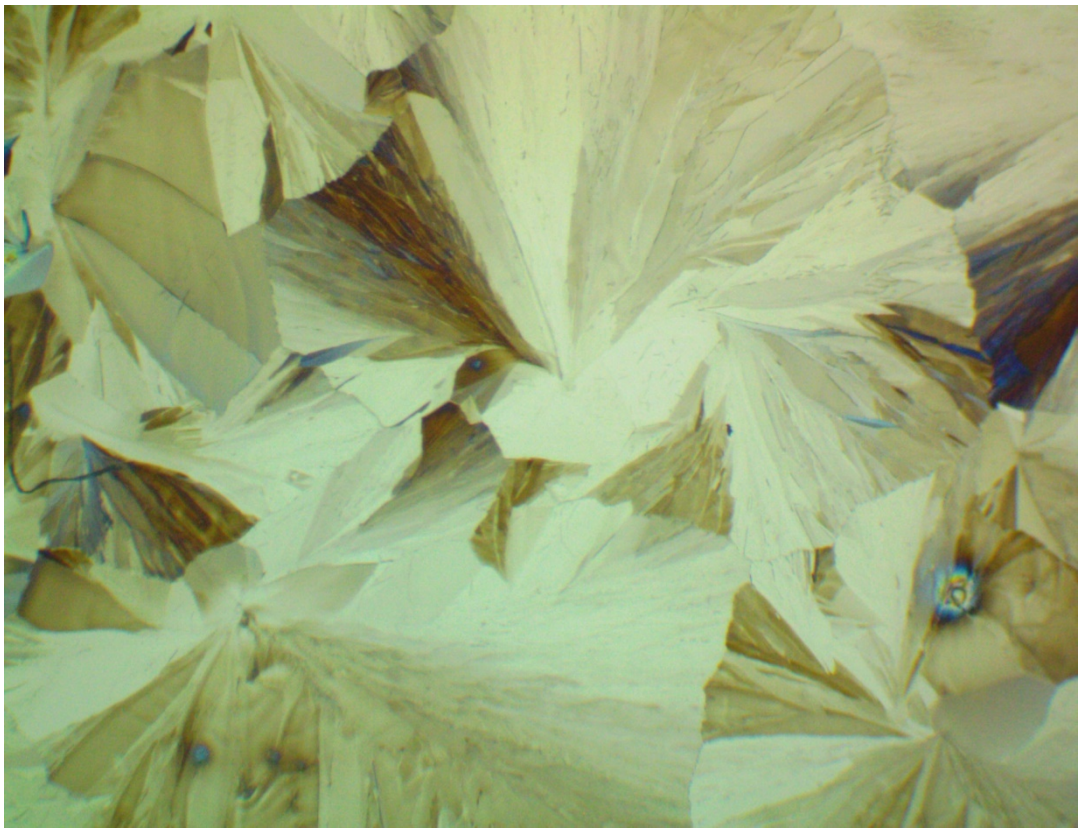
Tartaric acid brightfield



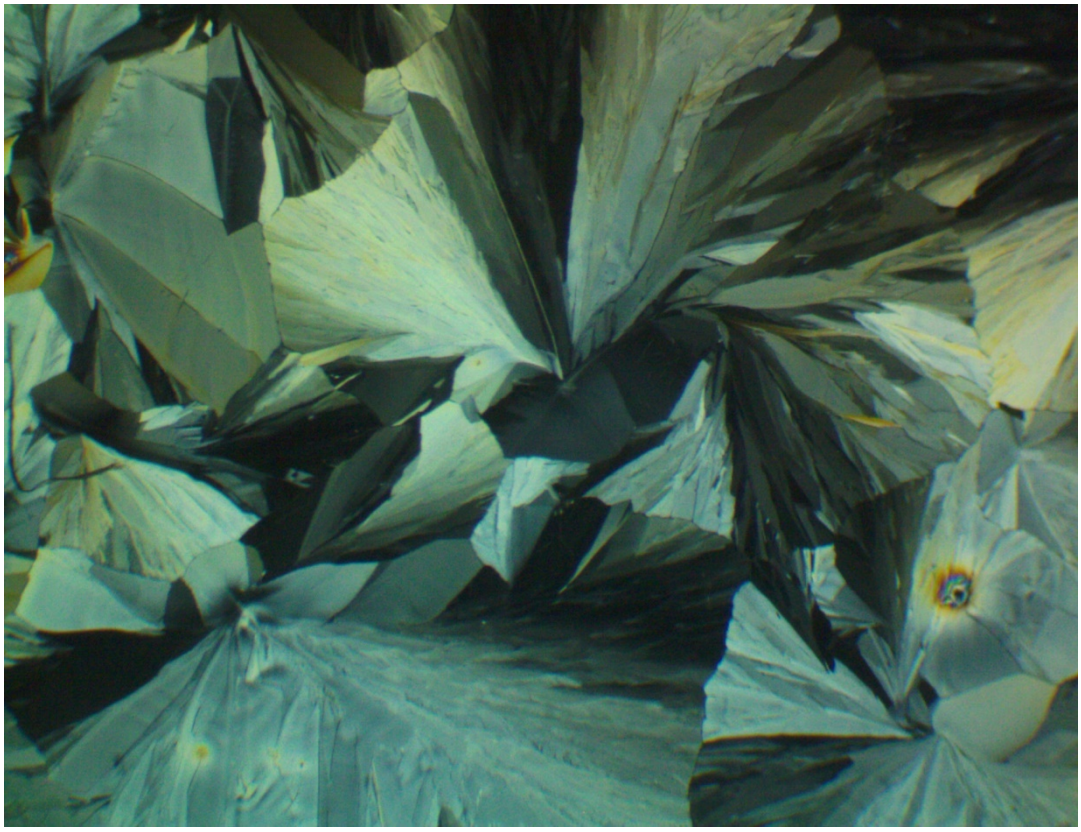
Tartaric acid darkfield



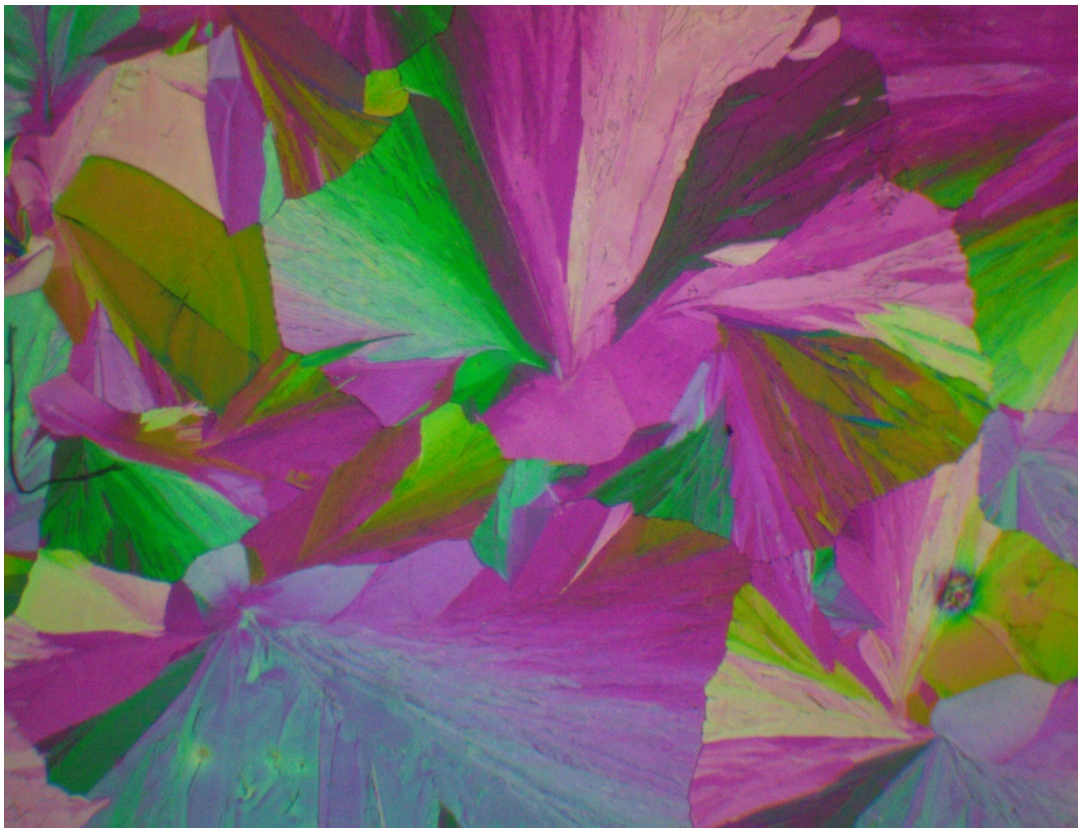
Tartaric acid between parallel polarisers



Tartaric acid berween crossed polarisers



Tartaric acid between crossed polarisers with sticky tape waveplate



These images show only a tiny part of each slide, and illustrate the differences in the crystallization of each of these three simple fruit acids. The beauty of the images is in the eye of the beholder, **BUT:**

As we say here in Cumbria:

'Ave a go yersel'!

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James Stewart

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