MANCHESTER MICROSCOPICAL SOCIETY

Micro Miscellanea

Newsletter of the Manchester Microscopical and Natural History Society

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Letter from the President

I write this letter on VE75 day, May 2020. They endured 6+ years – making me think how has our Society managed its last 6+ months?

Summer 2019 – a long time ago, we had a great all day meeting at the University of Manchester, including an update from myself on the magnificent past, present and especially the future of microscopy.

Wow! Well is that it then! A number of the committee members discussing just before the start of the February 2020 MMS meeting about the poor turnout at recent meetings, problems of travel due to the heavy traffic in Manchester, lack of contributions to meetings and articles for the Newsletter, and of course lack of younger members. Should we finally wind things up at the AGM next month – our 140th anniversary? This had been discussed several times in the previous months.

Ten minutes later all changed – several members arrived, a new younger chap high up in a major microscope supply company also appeared – keen on joining and possibly producing social media pages for the society. He also presented an update on use of state of the art image analysis. So encouraged, we started to plan next season.

One month later – all changed again, several days before our 140th AGM, coronavirus COVID-19 lockdown and social distancing arrived and we had to cancel the meeting at short notice, especially as many of our members were male and aged over 70! This looked like the last straw. Sadly, I am also certain that in the next few months we will hear of the untimely demise of some of our members.

Two months later, May 2020, great news – we have a new edition of the Newsletter thanks to James. With new found time on our hands many members are doing practical microscopy again, myself included – eventually got around to wiring up the shed for the microscopes and doing photomicrography! I am even presenting 3D virtual anatomy dissection classes for work – so maybe microscopy next!

Also, some major news articles appeared in the scientific press of how modern microscopy (cryo-electron microscopy, fast image analysis) have cracked the 3D structure of SARS-CoV-2 spike proteins and will inform the vaccine producing teams. This seems reminiscent of JB Dancer's work on microscopical elucidation of bacteria in Salford's health problems in the 19th century.

So what next – come on, with lockdown experiences - no excuses, finish those fix it jobs, articles, online meetings, social media contributions – get them ready for an updated MMS pattern of interactions in the near future. We will keep some face to face and hands on meetings but will expect more alternative input from members. Watch this space. In its long history the society has

survived several wars, pandemics and famines do not let it down now. Send in articles, pictures, comments, however short, to the editor. Suggest ideas for meetings to me.
Best wishes to all our current and future members, keep safe and well, looking forward to reading this as history at the MMS 150th anniversary in 2030!
Mike Mahon, MMS President

Greetings from the editor

As an editor, I am supposed to choose what will go into the newsletter that would interest the majority of our readers – but this is a difficult task unless you – yes YOU send me some articles!, I am sending this as a newsletter, and will continue in this vein until we have enough to warrant the cost of a fully printed magazine.

It is important that during this awful time that we keep our spirits up and support each other as well as we can. I have not received sufficient articles to create a full printed magazine as yet, so may I ask that you to write to me about what you have been doing with your microscopy to keep yourselves occupied? Include pictures if you can.

I'd love to know whether you have a specific area of interest. Until a few months ago I was a Snr Lecturer in design history at the University of Central Lancashire. Having had an interest in amateur science all my life, my research was based on science and design, for example making repeat patterns from microscopical images, some of which I had printed onto materials.

Each summer Uclan has a Science Festival, and with some of our colleagues from the MMS, I ran an introduction to microscopy for young people, which was always popular. I was thinking that perhaps this summer we could arrange a similar project at the MSU?

I really think that it is important to involve young people in events such as this in order to create an interest in microscopy as a fascinating and rewarding hobby.

I was wondering whether we could arrange something like this in the summer in Manchester. Perhaps we could have a few spare microscopes for sale at reasonable prices – I am sure most of us have an odd old 'scope we could sell at a reasonable price? Please let me know what you think…

I am always looking for new articles for our own magazine too, so whilst we are all under lockdown it would be a good time to ask YOU to let us know about your own specific interests or favourite specimens or instruments?

Like most members I suppose, I have several instruments, but my main two are a pair of Vickers M41's. These are beautiful instruments – but a bit too heavy to lug around, so I also have a pair of Zeiss Standards which are easily portable. The two Zeiss's – believe it or not – were saved from the recycling team at the university. Neither had any objectives or eyepieces, and although designed for infinity objectives, work very well with my Vickers objectives. However, my two favourites are my two Vickers M41's – one. A polarising M41 was a kind gift from Norman Scott, and the other 'scope I bought from my late friend Nick Parry of Nick's Science Supplies – who luckily lived within walking distance from me. The only problem with the M41's is their weight - beautifully made, but not easily portable!

Please let me know about the instruments YOU use – what you like or dislike about them. Think about this – if you could only keep ONE microscope and ONE prepared slide to take on a desert island, which one would you chose – and why! If every member could choose just one, and send

us some pictures of same, and tell us why these are your chosen ones to take with you – we'd have plenty to fil this magazine each quarter!

Also it would be nice to have a sale or swap page – surely all of us could find some equipment we never use, or some slides we hardly ever look at which another member would enjoy? Let me know!!!

A COUPLE OF DANCERS

Having been born in Manchester I am obviously interested in John B Dancer, but alas his 'scopes rarely come onto the market, and when they do the prices are high. I am fortunate in having an aneroid barometer of his, and a small spotting 'scope – pictures of these are below.

Perhaps one day I will come across one of his microscopes too – although that would mean going on my hands and knees to the bank manager (but worth it!!!). I am, incidentally, bequeathing both my Dancer instruments to the MSM. Let's just hope there is a Dancer microscope to enjoy and add to my bequest before then!

PLEASE help keep this Society alive and well – email or post me some articles! Tell us about your favourite slide or instrument, or if there is a specific area of microscopy that interests you. This is YOUR society and YOUR newsletter – so let's keep it alive and interesting by sending an article or a few notes (with pics or favourites).

I have added a 'Book Reviews' section to the newsletter where I discuss some of my new and old microscope related books or articles. How about letting us know about your own favourites. There are a number of web pages on microscopes and techniques, why not review some of these for our fellow members – just drop me an email – or letter with the www address and your comments. Not all our members have internet access, so if a member reads about web based article in this newsletter, which they cannot access just drop me a line **together with a stamped addressed return envelope** I will endeavour to print it out and post it to you.

Let's keep this newsletter alive – please do write or email me your comments (good or bad), articles or sales & wants – You can email me or post your articles. **Thank you**.

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BOOK REVIEW

As I started to look through my microscope books today in order to choose one or two for review, I came across a copy of 'Experimenting with the microscope' by Dieter Krauter. I bought this at one of the Quekett Microscopical Club meeting over the last year or so. To my horror, when I took this off my bookshelf for review I realised that this book – which I bought at one of the Quecket microscope meetings some years ago – actually belongs to the Manchester Microscopical Society!

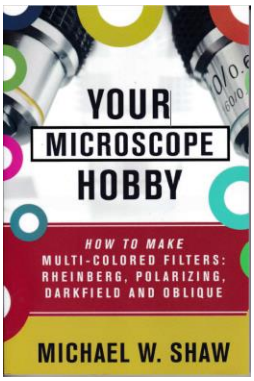
This takes me many years when I first joined the society. I had bought some rare microscopical books from a dealer in Manchester. The books – which were a set of 'The Nothern Microscopist' - each had the Manchester Microscopical Society bookplates, and when I researched the society I was surprised to find it was still an active society. I did a little research and came across Roy Winsby 's details. He invited me to the next meeting, and I took these books with me to the meeting. Roy politely pointed out that these had been stolen – together with some antique microscopes - from the society's collection, together with some antique microscopes!

I immediately donated the books back to the society – although Roy told me as I had bought them in good faith, I should keep them – otherwise the society would reimburse me. I refused and donated them back to the society on the basis that I could always borrow them in future, and that was how I became a member! Since then I have bought another set – which I still enjoy.

More recently, I was talking to Eric Levick, a microscope collector friend in the USA, and he mentioned that he had bought a large Ross microscope on a visit to England, and that it had a 'Manchester Microscopical Society' sticker! I gently pointed out that this was probably stolen from the Society, but hid argument was that as he had bought it in good conscience, he was entitled to keep it. Well, at least I tried!

It is so important that if we borrow a book, or an instrument for that matter, we return it for the benefit of our fellow members. So please do check your shelves in case you have any MMS books you've forgotten to return. Needless to say, I will be returning the 'Experiments with the Microscope' forthwith! Thank you.

BOOK REVIEW: **'Your Microscope Hobby ' by Michael W. Shaw.**



This is one of those books which every microscopist should have on their shelves. I ordered my copy through my local book shop but it is also Amazon. It's a wonderful 'how to do' book on making Rheinberg filters at home. When you buy the book Michael also gives you a www address to download the book into your Kindle or another type of e-reader.

OK, most of us know how to make Rheinberg filters, but there is so much information and advice in this work that I consider it a 'must' for any microscopist's library.

Ernst Abbe *by Nicole Phillips*

Introduction

Ernst Abbe Hon FRMS 23 January 1840 was a German physicist and optical scientist., He worked with Otto Schott and Carl Zeiss, and laid the foundation of modern optical theory with his diffraction theory of image formation.(1)

Personal life

Abbe was born 23 January 1840 in Eisenach, Thuringia. He came from a humble home and was supported by his father's employer, Abbe graduated from Eisenach Gymnasium in 1857. Abbe studied at the Universities of Jena (1857–1859) and Göttingen (1859–1861). During his time as a student, Abbe gave private lessons to improve his income and was awarded his PhD in Göttingen on 23 March 1861. This was followed by two short assignments at the Göttingen observatory and at Physikalischer Verein in Frankfurt (an association for those interested in physics and chemistry). On 8 August 1863 he qualified as a university lecturer at the University of Jena. In 1870, he was appointed an associate professor of experimental physics, mechanics and mathematics in Jena.(1)

In 1871 he married Else Snell, daughter of the mathematician and physicist Karl Snell. He attained full professor status by 1879. He became director of the Jena astronomical and meteorological observatory in 1878. In 1889, he became a member of the Bavarian Academy of Sciences and Humanities. He also was a member of the Saxon Academy of Sciences. He was relieved of his teaching duties at the University of Jena in 1891. Abbe died 14 January 1905 in Jena.(1)

Life Work

Abbe defined the term numerical aperture as the sine of the half angle multiplied by the refractive index of the medium filling the space between the cover glass and front lens.

$$D=\lambda/2NA \qquad \textbf{Eq. 1}$$

This formula first appeared in a publication in 1874 by Helmholtz, who stated this formula was first derived by Joseph Louis Lagrange. Abbe was of the opinion that resolution was dependent on numerical aperture was but also argued that there are other parameters that should be considered over the aperture in the design of objectives. In Abbe's 1874 paper, titled "A Contribution to the Theory of the Microscope and the nature of Microscopic Vision", Abbe states that the resolution of a microscope is inversely dependent on its aperture, but without proposing a formula for the resolution limit of a microscope.

In order to produce high quality objectives, Abbe made significant contributions to the diagnosis and correction of optical aberrations, both spherical aberration and coma aberration, which is required for an objective to reach the resolution limit of **Eq. 1**. In addition to spherical aberration, Abbe discovered that the rays in optical systems must have constant angular magnification over their angular distribution to produce a diffraction limited spot, a principle known as the Abbe sine

condition. So fundamental was the Abbe theory that Frits Zernike derived his phase contrast work on them as did Hans Busch on his development of the electron microscope.

In 1866, he became a research director at the Zeiss Optical Works to improve the manufacturing process of optical instruments, which were at the time developed mainly on an empirical basis. He developed the apochromatic lens and the Abbe condenser. His input considerably improved the status of the Carl Zeiss name when in 1872 a new range of microscopes was introduced. Where, in the past, Carl Zeiss had struggled to put lens design on a scientific basis, Abbe made an array of instruments used to analyse lens characteristics to lift lens quality to a higher level and an essential part of rational production. The objectives of the Abbe Zeiss collaboration were of ideal ray geometry, allowing Abbe to find that the aperture sets the upper limit of microscopic resolution, not the curvature and placement of the lenses. In 1871 he presented his design for a water immersion lens based on the suggestion of John Ware Stevenson, this went into production in 1877. This was a major break though.(2)

In 1871, he designed the refractometer, and he developed the laws of image of non-luminous objects in 1872. (4).

On 23 July 1885, the company Jenaer Glaswerk Schott & Genossen was established. Its partners were Carl and Roderich Zeiss (Son), Ernst Abbe and Otto Schott the remit being to develop new types of glass particularly in the development of glass for the apochromat lens. The apochromat lens was eventually launched in1886.

Carl Zeiss died in 1888 and Abbe, as successor formed the Car Zeiss Stiftung (foundation) to run the Carl Zeiss and Schott Glass companies to protect the staff in the future. This included a form of pension fund and a discharge compensation fund and a fixed hours working week, over time and other benefits.

These principles would later be incorporated by the Prussian state as a model and idealised by Alfred Weber in the 1947 book Schriften der Heidelberger Aktionsgruppe zur Demokratie und Zum Freien Sozialismus.

(1) wikipedia, https://en.wikipedia.org/wiki/Ernst_Abbe

(2) Carl Zeiss AG, https://www.zeiss.com/corporate/int/history/founders/carl-zeiss/ernst-abbe-joins-forces-with-zeiss.html

(3) John Ware Stephenson, On an Erecting Binocular Microscope in the Monthly Microscopical Journal, volume 4, page 61 (1870)

(4) http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2818.1929.tb00777.x/abstract

(5) https://www.britannica.com/biography/Ernst-Abbe

(6) By Emil Tesch https://commons.wikimedia.org/w/index.php?curid=10358290

SALES & WANTS

I am also sure most of us have some equipment we don't use, or some slides we rarely look at – I do, so I am introducing a Sales & Wants section in the newsletter. Come on …have a look and drop me a line or email with details (and with pictures and a price) and I will put these in the next newsletter.