

Seventy Years of Making Microscope Slides.

**A brief history and chronological tour of slides by Eric Doddrell Evens,
20th April 1893 to 6th November 1973.**

E D Evens was an amateur slide maker in the early 20th century. In this presentation I have included images of slides he made from 1909 to 1973 representing:

- The types of objects he mounted;
- The mountants he used;
- But mostly showing the consistent quality of his work over 64 years of slide making.

Please be tolerant of the images I have used, because most have been extracted from the bulk photographs taken by a series of volunteers since the 1990s to catalogue the QMC collection, the early ones were analogue and have been digitised, the quality is variable.

Just a few have been taken recently, again for cataloguing purposes and with a target of readability over content during the very limited access to the collection.

In an ideal world we will eventually have excellent photographs both of the slides and their content. *One day.....maybe*

Why do we collect things?

There are many people who get a lot of pleasure from collecting things, and their reasons are as varied as the objects;

- satisfaction from owning a rare artefact;
- pleasure in the aesthetics of the object;
- interest in the provenance of it;
- appreciation of the information contained in it;

all of these are common reasons to collect.

What do we value in relation to microscopy?

In the field of microscopy there are ample opportunities to satisfy all of these urges both with respect to:

- the machinery used to make minute detail visible;
- the methods of preparing the subjects;
- the detail revealed by a good mount, and, of course;
- assembling the products of a master craftsman.

One such master is Eric Doddrell Evens.



Figure 1 Eric Doddrell Evens , 1918, aged 25 years
BMAG archive EVE3

This analytical chemist from Bristol spun his magic from the early 1900s to 1973. For nearly 70 of his 80 years he refined the preparation and mounting of objects for microscopical examination. He took pains to understand the processes needed to produce and preserve fine mounts. Slides by Evens are still sought after and treasured.

But microscopy was not his only notable activity, 'hobby' seems too facile a word to describe what he did. His legacy includes:

- Thousands of the above mentioned slides; ^Q
- An archive of landscape photographs of the South West of England in the early part of the 20th century; ^B
- A archive of about 50 photographs of astronomical objects taken between 1910 and 1915; ^B
- Cave photography on Mendip [1919-1926] described in 'The Belfry'ⁱ in 1982 as 'significant',
- Petrological surveys [1921-1940] that still inform the understanding of this region during the Carboniferous Era (Howard Falcon-Laing 2012ⁱⁱ);
- Other petrological surveys (SWGMAgⁱⁱⁱ) that contribute to understanding of the origins of Neolithic stone implements in the South West, and
- A healthy catalogue of scientific publications, both from his hobbies and professional life.
- And, of course PMS notebooks^{iv} prepared by him and ones in which he made comments. It is from these that much of the information I have has been gleaned.

The obituary written in 1974 by his colleague Frederick Stretton Wallis for the Bristol Museum and Art Gallery finishes by describing Evens thus.

"He was almost a recluse, made few friends, but those who were so privileged will always remember his meticulous work and his readiness to discuss any subject in a helpful manner."

I would beg to differ, although Wallis and Evens worked together on geological matters and published joint papers from 1924 right through to 1972 he would have known the man in the reserved way that people did in the early 20th century. I have read tens of entries made by Evens in Postal Microscopical Society notebooks. The overall tone of these entries is accessible, friendly and helpful, they are like having a conversation with him. I consider that he may have been a private man at home, but he had many, many friends through the medium of his notebook entries. Friends akin to modern day Social Media friends, with shared interest and concerns. These notes certainly show his readiness to discuss any subject, and the comments by PMS members on his slides bear witness to his meticulous work. He was not friendless, he was held in high regard and his opinions sought after and respected by a wide circle of people across two continents.

So what shall I talk about today, the slides, the geology, the photography or the chemistry? It will be the slides, however they cannot be considered in isolation.

The slides.



Figure 2 One of the many trays of slides in the E. D. Evens collection belonging to the Quekett Microscopical Club.
 QMC archive image Cabinet 20, Tray 5

In the course of helping with cataloguing I have been privileged to have had access to the ED Evens slide collection at the Quekett Microscopical Club. This collection has in the region of two and one half thousand mounts made between 1909 and 1973 with subjects that include Geological, Chemical, Botanical and Zoological objects. It is a wide-ranging array of material. The mounting media range from dry mounts, through a variety of solid materials such as Balsam variations, Gum Arabic, Dammar, DPX, Euparal, Farrant's Medium StyraX, MS2 Resins, and liquid mountants based on Glycerine, Invert sugar, Formalin, sea water and so on. The point being that he tried all sorts of mountants, and generally experimented with changing the formulation to

achieve specific outcomes depending on the subject of the mount. The one that comes easily to my mind is to include a buffer in liquid mounts when dealing with soft-bodied organisms with calcareous structures, the alkaline buffer reduces the dissolution of those structures by acidification of the medium over time; its inclusion was a considered chemistry solution to a well-known problem.

What is most striking to me on handling the slides is the delicate elegance of the mounts each of which is framed by his signature shiny black ring. He achieved the uniformity of these rings with patience. Ringing the mount many times over many weeks to effect as good a seal as possible before adding the lamp black to the sealant, two coats of this with days of drying between have given durable, effective and beautiful rings. The 1961 article "The Preservation and Mounting of Desmids and other Algae" in JQMC^v gives all the details you would need to replicate his technique, although an article is descriptive and cannot give you his dexterity and skill, that comes only with practice.

Now let see some.



[Q](#)

This, a wasp sting mounted in 1909 in Crude Balsam, is the earliest slide in the QMC collection, not the first slide he made. In the Bristol Museum and Art Gallery E. D. Evens Archive there are photomicrographs of arranged sponge spicules, Moth antennae and a female flea that he made from as early as January 1908 and by 16 and a half he was already producing notable mounts

The Great War Era

During the Great War Evens was exempted war service as he was teaching in first Bristol, then London.



These mainly botanical slides mounted either in Xylol-Balsam or Glycerine, exemplify the simple elegance of his mounts, all of them now over 100 years old and still in very good condition.

In 1919 Evens donated six slides to the Quekett Microscopical Club.



I wonder if this beautifully sectioned and stained equisetum cone was one of those, - - - it could be.

As a young man.



These slides were made during his years in London from material he collected himself. Throughout his life Evens collected material. Sometimes he made slide almost immediately, others he held the specimen for years before making the slides.

In PMS notebook 154 written in 1955, Evens said, "I first found this alga on mud at the mouth of the Welsh Harp reservoir north west of London in 1917" (PMS notebook 154 1955)



Mr A. J. Dodd commented "Mr. Evens' mount is excellent for such a difficult tiny and collapsible balloon."

– This slide of Botrydium was from that early collection.

Mr Evens commented:

"It is shaped like a balloon with the pointed end immersed in the mud which the colourless roots penetrate. The green part projects into the air.



Figure 3 Botrydium Granulatum.
Image by David Linstead

The whole plant is a single cell although it may be as much as 3mm diameter but it contains many nuclei & so is coenocytic. If placed in water the sphere bursts and the contents pass out as zoospores. If the mud is made very wet but the plant is not covered by water, the contents pass into the root & the sphere collapses but leaves a group of spores on the surface. Then again the root may send one of its branches to the surface & develop a fresh balloon.

It is not at all common but when it does occur it is said to be extremely plentiful, covering acres of the mud with its green spheres.

It is usually found on the muddy bottoms of a partly dried reservoir, not under water but in the air.

There is an interesting account of it given by Mr James Burton to the Quekett on Nov. 22 1910 [Series 2, Volume XI, 1910-1912, page 209-212] & extracted in the English Mechanic, Dec 2, 1910, 92, 405. "

In 1921 two articles^{vi} by Evens on mounting freshwater algae, etc. in fluid mounts appeared in the Journal of the Quekett Microscopical Club, describing in detail his way of ringing that had produced such durable mounts of such an ephemeral medium.

In the same period he was an active member of the Quekett Microscopical Club and joined their excursion to the Royal Botanic Gardens at Regents Park on 12th April 1919 where among the specimens he collected was Vaucheria.

By the time he mounted it (in 5% Formalin) on 30th April it had germinating zoospores.



Keeping specimens and subsequently mounting them after some development, features quite a lot in his microflora and fauna slides.

The Geology Years – with a bit of Botany and Chemistry on the side.



Although the botanical slides are the most visually attractive ones (to me) there were plenty of geological and chemical ones made in the twenties.

Here we have

- Aulacite : Olivine basalt from Road metal from the Goods Yard in Keynsham;
- A fossiliferous slide from K2 beds of Carboniferous lime stone from the Mendips with Polyzoa and Crinoid stems;
- Crystals of Magnesium Ammonium Chromate;
- A delicately section, stained and mounted Lycopodium clavatum cone.

This slide of fossil polyzoa and gastropods is jammed with really interesting objects.

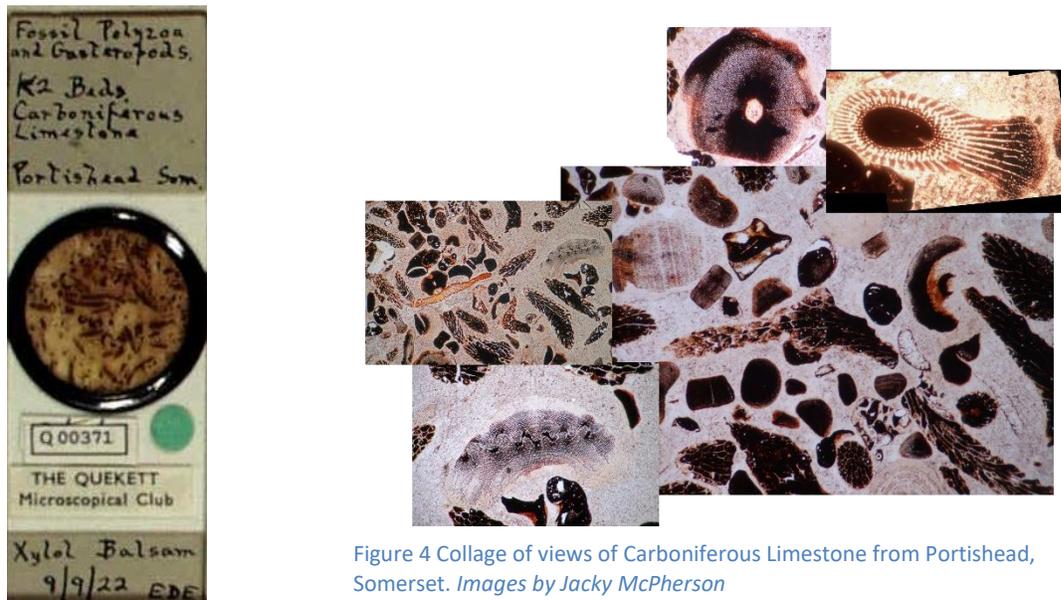


Figure 4 Collage of views of Carboniferous Limestone from Portishead, Somerset. Images by Jacky McPherson

In this period he was also

Taking wildlife and caving photographs

And researching and writing an article about "Igneous Rock at Hestercombe, Somerset", with F. S. Wallis^{vii}

What did he look like?

In the 1953 PMS Notebook 109 "Introducing Mr. ___" Mr. Stanley Patrick invited members to *"include a snap of themselves. We all want to see what each other looks like and in entering into the spirit of this organisation we shall get real pleasure and find some very interesting photos and reading matter."*

Evens's response was this:

"I am sorry but I do not possess a photo of myself so am afraid Mr. Patrick will have to go without. In any case I don't think he would find my face very interesting. It isn't double stained and no nuclei are visible and it doesn't even polarise. I sometimes think it would do it good if it were treated with potash".

Images of Evens are rare.

There is a photo in the Bristol Museum and Art Gallery archives. On the reverse is written E.D.E. This is almost certainly Evens on a geological or maybe speleological expedition and it is very likely this was taken in the Mendips in about 1925. In it you can see a very relaxed man with a moustache, in an all-in-one suit and a cap of the sort that cavers used at that time, sitting under an overhang among rocks and much more at ease than the formal portrait of 1918.

The middle years, 1920s to 1940s

From the early 1920s to 1945 he was co-owner of a dye grinding mill on the River Chew in Keynsham. *I wonder if he is the figure in front of the wall in this postcard?*



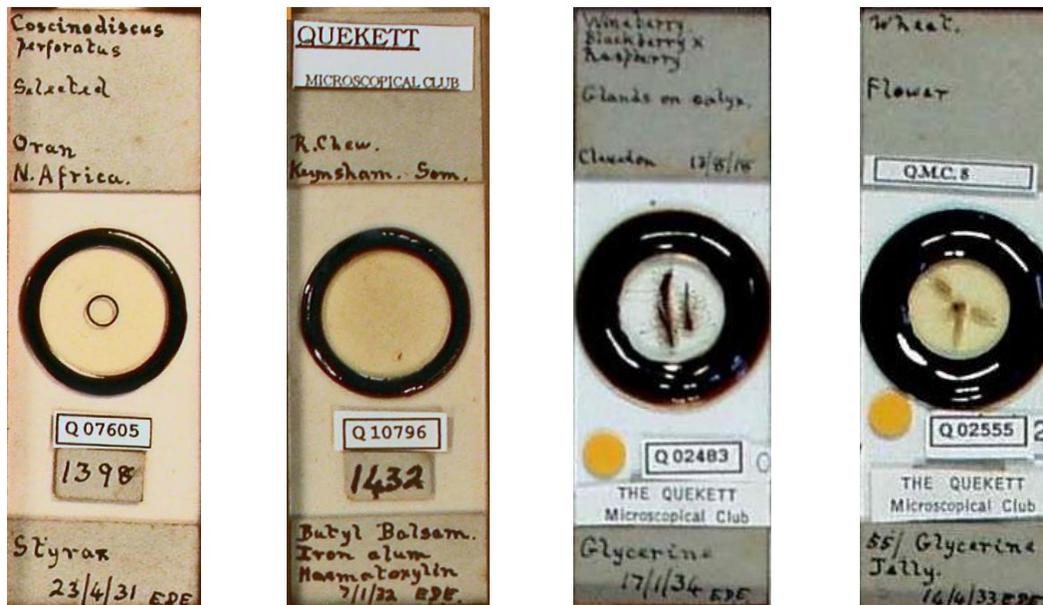
Figure 5 Dye Mill, Keynsham
BMAG archive

As a dye chemist he had an excellent understanding of the processes involved in staining sections, many of his slides are composites with comparable sections stained in different ways to reveal different aspects of the object.

Never one to limit his horizons Evens's eclectic interests are present throughout the whole period of the collection

1930s to 1940s.

Microscopically he also experimented with different mounting media, in these slides he used:



- Styrax for the diatom;
- Iron Alum and Haematoxylin to stain and Butyl Balsam to mount material from the River Chew – which ran past the dye mill. I have not yet had the opportunity to see what this looks like under a microscope, when I do I expect it will be obvious why he used that combination of chemicals;
- The Wineberry – showing the glands on the calyx is in plain Glycerine, but
- The Wheat flower is in 55% Glycerine jelly and has a slight yellowish tinge.



- The fossil sections from the Conygar Quarry near his home are mounted in Petrol Balsam.

During the Second World war he experimented with petrol as the solvent and decided that it was of no benefit, this did not become one of his regular formulations.

These fossils are part of a twenty year survey he undertook of the Conygar Quarry that contributed to some understanding of the intertidal regions of the North Devon Coast in the Carboniferous period^{viii}.

The Austerity Years.

In the slides shown here Evens has used a 20% invert sugar:65% glycerine mountant or dry mount with a wisp of zinc chloride asbestos to act as a desiccant.

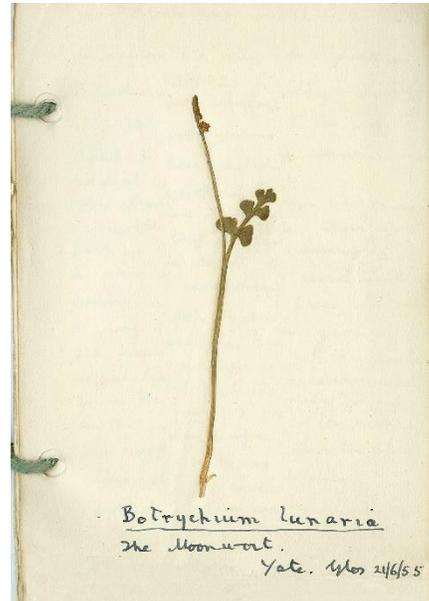
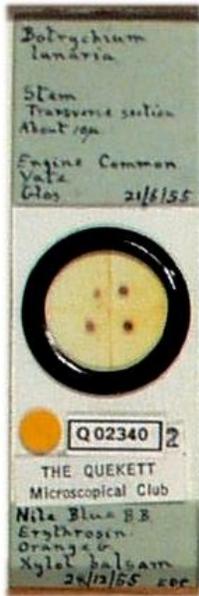


This was a time when many microscope slide makers experimented with everyday materials for example to make deep cells in the scarcity of their usual supplies. In a 1952 Notebook Evens^{ix} mentioned that cardboard soaked in petroleum jelly for cell construction and using small pieces of coverglass embedded in petroleum jelly or petroleum jelly formed on glass 'legs', that were withdrawn at the last moment, had been advocated as a substitute for the usual materials. He had considered using these methods but none were very successful.

Evens' slides generally have a metallic or plastic cell support. He did frequently put in a ring of soft paraffin outside the cell to act as a waterproofing agent to protect the lacquer used to seal the cell. It is well known that, in liquid mounts, the solvent in the liquid reacts with both the subjects and the cell wall over time generally to the detriment of the preparation.

Into the Elizabethan Age.

The Xylol Balsam mount of *Botrychium lunaria* was the subject of a poster I presented at Quekex 2016.



The four sections of stem on the slide came from the bottom end of a sprig that had subsequently been pressed and included in the PMS Notebook 174

Evens replied to a comment thus:

"Mr. Gauld remarks on the cover of the Moonwort section being cracked. Actually it is not. The two sections were attached to two separate half covers and stained independently. They were then put together on the slip with a drop of balsam, then a second drop was added & a complete coverglass. The "crack" is the junction between the two half glasses & it is filled with balsam which is rather yellow, probably from its having dissolved the excess of Orange G stain"

I do find the dried flower mounts really pretty, although they have been displayed to show all the relevant structures rather than to be a 'flower arrangement'. Most of these have the same desiccant arrangement with zinc chloride and asbestos. Their colours are well preserved.

We even have the humble carrot and the daisy, nothing was too common for Evens to be interested in it.



Towards retirement - not really.

The bladderwort slides are breath-taking, these are images of the slides as they lay on the bench, I really want to see how they look under a microscope.



Utricularia minor would make an excellent subject for a fabric or wallpaper.

Will the detail of the trapdoor mechanism still be very clear?



In the Utricularia vulgaris collected in 1936 and mounted in the 1960s you can see 'eye' spots in the captured prey.



In his 70s the palette is still broad.

Evens used different formulations of mountant to achieve particular effects.

The Atriplex (Salt Bush) leaf mounted in 3% sodium chloride, 0.5% zinc acetate and 2% formalin looks really 'as in life', it is another one I'd like to see magnified to see if the bulbous hairs on the lower surface can still be seen clearly



The Rochelle salt (Potassium sodium tartrate), a material with piezoelectric characteristics, is Orthorhombic and the symbol on it seems to indicate that it has been sectioned at probably 90 degrees to the axis.

This is a deep mount and the ringing has suffered through being in a drawer of inadequate clearance. I have moved these very deep slides into more suitable storage by taking out the drawer above in the cabinet so chafing will no longer occur.

Evens did make some very deep mounts.

And he was still collecting and mounting geological specimens,



Evens often revisited his earlier collections and slides, sometimes making a remount, others a fresh mount from preserved material. So far I have not located any notes about how he stored his specimens, that is top of my current 'wish list'.



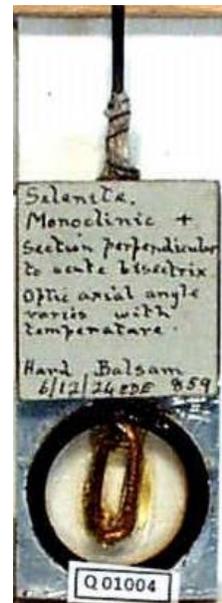
This Nymphaea section collected on a Quekett Microscopical Club outing to Sion House Long Pond in June 1918 was finally stained and mounted in December 1962.

In 1924 Evens made this slide of Selenite.

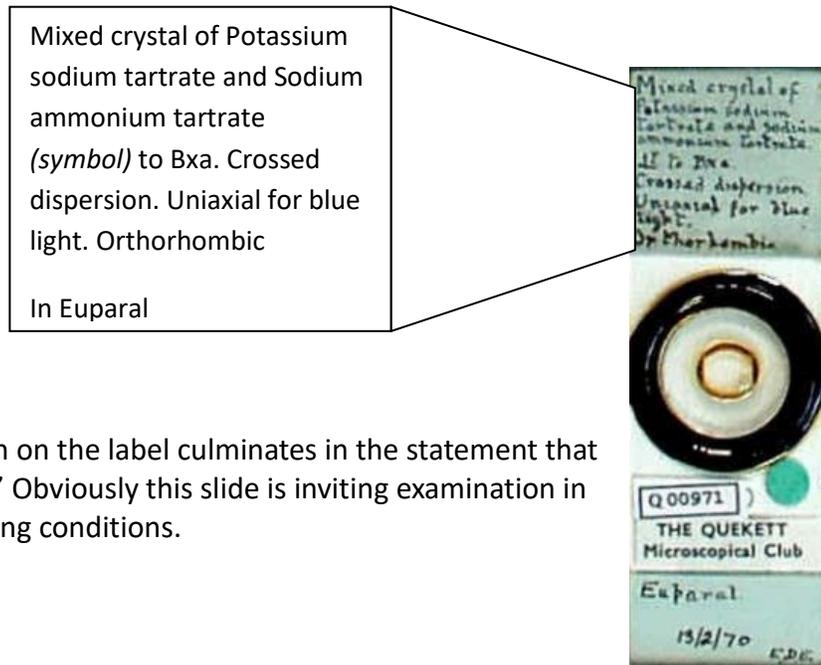
He noted that it was
Monoclinic + section perpendicular to acute Bisectrix.
And that the Optic axial angle varies with temperature.
It is mounted in Hard Balsam

So that this temperature effect may be observed he included a loop of thick wire that may be heated to change the temperature of the crystal.
I have not tested out the effect of heating the wire – *a trepidaceous thought.*

At first I thought the slide was broken, but he had cut it down so that it still fits into a slide cabinet drawer.



Evens's labels are characteristically crammed with detailed information like slide of the Mixed crystal of Sodium tartrate and Sodium ammonium tartrate.



The wealth of information on the label culminates in the statement that it is 'uniaxial for blue light' Obviously this slide is inviting examination in a variety of different lighting conditions.



The most recent specimen we have in the collection is of *Dryopteris filix-mas* collected on Walton Common, near Clevedon in July 1971.

This *Lithospermum* (Gromwell) was mounted in January 1972, not long before Evens's 79th birthday although he had collected the specimen 14 years earlier.



In September of that year his cousin sent him a postcard and said,
"Very sorry to hear the gear trouble with your cycle, hope it is not too awkward to mend."

The Bicycle.

Evens was still a very active man and his bicycle is now on display in the M Shed museum in Bristol. Apparently he got this as a boy and amended it in many different ways to suit his needs. It started out as a Humber, and ended up as unique. Henry Hatherly, in the obituary for the QMC, said that he was well known as he cycled around the Mendips over many years making his collections and taking photographs with his plate camera.



Figure 6 Humber bicycle belonging to E. D. Evens. Currently displayed in M-Shed, Bristol

The last slide.



The Encephalartos was remounted on 9th October 1973. Evens always took a while to set his slides before ringing them and his death four weeks later obviously prevented him from completing this mount.

The Collection.

This is just the tip of the iceberg.

Here we have about 50 slides out of the 2300 plus slides in the collection

I chose the images of slides that would look interesting and attractive as seen.

I have not included many of the slides for which the man is best known, the glycerine jelly fluid mounts, because they look best under a microscope and the opportunity to photomicrograph many of them has not YET occurred.

It will - and more of the iceberg will be revealed in good time

And some final images of slides I particularly like



The three specimens here are *Funaria* capsules, *Lycopodium clavata* cone, and *Utricularia vulgaris* bladders

This started out as a slide presentation for the Northampton Natural History Society Exhibition on 25th June 2017. Following another visit to the Bristol Museum archives it has been amended and extended for this Report.

Sources:

The hyperlink from the item will display the source of the material at the top of the page.

Bristol Museum and Art Gallery archive

Quekett Microscopical Club archive

Image by Jacky McPherson

References Used (most of them)

ⁱ **D. J. Irwin.** 1982 Early Cave Photographers and their Work, 'The Belfry'(Bulletin of Bristol Exploration Club) v 36 pp406-407

ⁱⁱ **Howard Falcon-Laing at al.** 2012 Pennsylvanian (mid/late Bolsovian-Asturian) permineralised plant assemblages of the Pennant Sandstone Formation of Southern Britain: Systematics and Paleoecology, *Review of Paleobotany and Palynology* v173 pp 23-45

ⁱⁱⁱ **Evans, E. D. et al.** 1962 The Petrological Identification of Stone Axes. Fourth Report of the Sub-Committee of the South-Western Group of Museums and Art Galleries', *Proc. Prehistorical Soc.* v28 pp 209-266

Evans, E. D. Smith I.F., Wallis F.S. 1972 The Petrological Identification of Stone Axes. Fourth Report of the Sub-Committee of the South-Western Group of Museums and Art Galleries', *Proc. Prehistorical Soc.* v38 pp 235-275

^{iv} Archive of **Postal Microscopical Notebooks** belonging to Steve Gill.

^v **Evans, E.D.** 1961a. The preservation and mounting of desmids and other algae *The Journal of the Quekett Microscopical Club, Series 4, Volume V, 1958-1961 (Volume 28), Part 15 (Ed. - H. A. Dade) Quekett Microscopical Club [August 1961]*, p.405

Evans, E. D. 1961b. Some notes on glycerine mounting media *The Journal of the Quekett Microscopical Club, Series 4, Volume V, 1958-1961 (Volume 28), Part 16 (Ed. - H. A. Dade) Quekett Microscopical Club [November D. 1961b. [November 1961]*, p.444

^{vi} **Evans, E.D.** 1921a. Fluid mounting *The Journal of the Quekett Microscopical Club, Series 2, Volume XIV, 1919-1922 (Volume 20), Part 87 (Ed. - A. W. Sheppard) Quekett Microscopical Club [November 1921]*, p.221

Evans E. D. 1921b. Mounting freshwater algae, mosses, etc. *The Journal of the Quekett Microscopical Club, Series 2, Volume XIV, 1919-1922 (Volume 20), Part 87 (Ed. - A. W. Sheppard) Quekett Microscopical Club [November 1921]*, p.225

^{vii} **Wallis F.S., Evans E.D.** 1930 Igneous Rock at Hestercombe, Somerset, *Trans. Devon Asscn. (1926)* v58 p231

^{viii} **Howard Falcon-Laing at al.** 2012 Pennsylvanian (mid/late Bolsovian-Asturian) permineralised plant assemblages of the Pennant Sandstone Formation of Southern Britain: Systematics and Paleoecology, *Review of Paleobotany and Palynology* v173 pp 23-45

^{ix} **E.D. Evans** reply to comments relating to D. S. Spence and cells.in PMS Notebook 91 (1952)