Eric Doddrell Evens (1893–1973); Gifted Slide Mounter and Amateur Naturalist

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Foreword

This article is about a relatively unknown amateur naturalist who was active in the first half of the twentieth century. If you are interested in objects for the microscope, things that live in littoral zones, botany, the petrology of coal or prehistoric implements you might have encountered the name Eric Doddrell Evens. Otherwise, unless you have an interest in the chemistry of organic compounds, I doubt you will ever have heard of him.

My first encounter with Eric Doddrell Evens (EDE) was during a cataloguing exercise for the Quekett Microscopical Club (QMC) which included over two thousand of his slides. The collections at the QMC have over twenty thousand slides so this is a significant portion of the collection. At that time I had never seen an EDE slide under a microscope, and cataloguing was done from photographic images of the slides. During the exercise it struck me that over the sixty or so years that he made slides, their presentation and appearance barely changed, his writing remained unaltered and the general appearance of the slides was of elegant simplicity and beauty. It was really the constancy of the EDE collection that impressed me most. I was curious about the sort of person who could have achieved this state so I looked for a biography of him. The only easily available information was in the various obituary notices written in 1974 and they were brief. My curiosity was definitely aroused so I set about finding more concerning this individual. In the journey from that state of ignorance to my present knowledge I have had the privilege and pleasure to encounter not only the slides at the QMC but read entries by EDE in Postal Microscopical Society (PMS) notebooks, browsed the E. D. Evens archive at Bristol Museum and Art Gallery (BMAG) under the very helpful guidance of Deborah Hutchinson the Geology Curator, and explore as many leads as I could find concerning his life and achievements.

This article is a summary of who EDE was and what legacy he left behind in terms of advice and interpretation of the microscopical aspects of his life. There are other volumes that might one day be written about his photography of the Landscape of South-West England in the early twentieth century, his part in obtaining and analysing rocks that helped with the determination of the North Devon Coast and climate in the Carboniferous period, and possible locations for the sources of stone used for prehistoric implements. Those were his hobbies; professionally he was an organic chemist working on dyes and later pesticides.

What the research has revealed is an intense mind, somewhat spartan but with a quirky sense of humour. A man of high intelligence whose explanations and descriptions are as lucid as the slides, and one who would take great pains to help others understand something, but didn't suffer fools gladly In other words an interesting and intriguing individual.

The Family

In obituaries and eulogies Eric Doddrell Evens (Figs. 1 & 2) is frequently referred to as 'a man of few friends, almost a recluse' [1]. He was a very private person. I suggest that although EDE did not mix socially outside the family he did take an active role as child, grandson, nephew and cousin. He was an executor for both his father James William Evens and his aunt Clementina Boucher, and in later life his closest friend was his cousin on his mother's side, L. L. Hiley. Looking through the family history one can see that this extensive family maintained close links through the sharing of addresses and executing of wills by relatives. He was not the only solitary person in the family; uncles lives were spent busy with service commissions in the Empire, maiden aunts lived together in their own establishments, and marriage was late, often remaining childless or childbearing later in life.

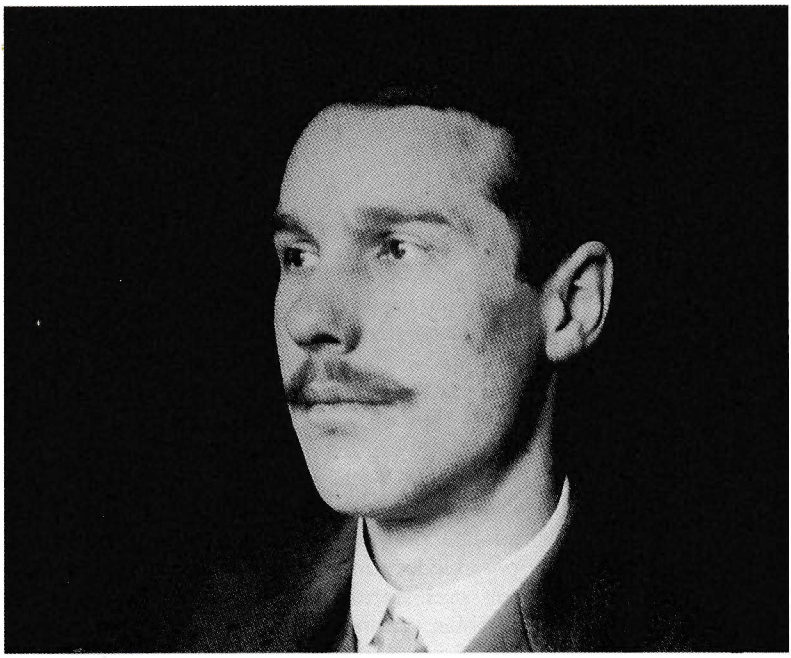

FIG. 1. E. D. Evens aged 25 in 1918. [Courtesy of Bristol Culture]

FIG. 2. Signature from PMS Notebook 25, November 1949.

So, he came from a large extended family, but what was their social station? On both mother and father's sides the grandparents were in trade, one a Tea Merchant, the other a Wine Merchant. More than one relative was listed in the Census records in a prestigious area, as 'living on own means' or 'gentleman', and with servants. In some branches the sons attended public schools such as Marlborough College in which they were groomed for public service. This was an Upper Class Victorian family with all the trappings; they occupied large houses and probate records show significant wealth being declared.

Eric Doddrell Evens, born 20th April 1893 in Bristol to James William Evens and Ada Mary Evens (neé Boucher), was one of the youngest grandchildren of James Evens, an established Wine Merchant of Bristol and his wife Mary, who came from Monmouthshire. James' father and brothers had traded in Wine and Spirits for a number of generations and Eric's father followed James into the trade. Altogether James and Mary Evens had eleven children, ten of whom survived to adulthood. However, only five of them had offspring; three of these had but a single child each.

In the Evens family, as well as interest in Wine and Spirit importing, there were strong links with mining and engineering. Thomas Evens, the eldest of James and Mary's sons, was a civil and mining engineer, as was his nephew George Cuthbert Coleman. Philip Ivor Evens was a secretary to a Colliery Company in 1891, and James and James William were partners in the Werfa colliery at Aberdare from the mid nineteenth century until its closure in 1906.

EDE's mother, Ada Mary Boucher (Fig. 3), whose family descended from French Tea Dealers, had three brothers and two sisters. The eldest, William Alfred Boucher was an Assistant Surgeon in the Indian Medical Service, and spent most of his life in the sub-continent. A younger brother, Francis John Boucher, emigrated to Victoria, Australia, many years before EDE's birth, where he had a career on Railways and where his descendants were born and raised. Edward Burge Boucher in the Merchant Marine died aged 24 before EDE's birth. These family members would have had little impact on EDE's

FIG. 3. Ada Mary Evens Date uncertain. [Courtesy of Bristol Culture]

FIG. 4. L. L. Hiley 29th March 1918 aged 27. [Courtesy of Bristol Culture]

upbringing except through reputation. Her youngest sister, Clementina, Boucher lived at home with her mother until she died in 1923. The remaining sibling, Georgina Boucher, married an Officer in the Indian Government, George Gould Hiley. He was an Indian born widower with two daughters and, shortly after they married, at Barnstaple, Devon, they had a son, Leonard Lewis Hiley, born in Lahore, India. The family came to England on George Gould Hiley's retirement, in about 1897, at which point his younger daughter, May Hiley, was baptised in Clifton. They then lived close to Ada, now married to James William Evens, and her family for some years. I think it likely that Ada, Georgina and Clementina had much to do with one another in the period when EDE was a young child, although there is little to confirm this apart from closeness of address. Clementina Boucher nominated EDE as her executor and L. L. Hiley was EDE's closest friend in later life (Fig. 4).

Wines, Mining, and the Empire featured in the family at the turn of the 20th century and this was the environment in which EDE lived. The cousins, aunts and uncles would be likely to form the core of his social group and be the most significant influence on him, remaining his closest confidants into later life. In his later publications EDE's writing is lucid, his published work suggests a man eager to explain and discuss things that interested him, not a crusty hermit keeping only his own company. The extensive family knowledge of wines, mining and engineering, certainly informed his microscopical slide preparations and photographic excursions and would have, no doubt, influenced his own career as an analytical chemist.

Eric Doddrell Evens' Life

In the late Victorian and early Edwardian period extensive housing for the affluent upper and middle classes was being built in the Bristol area. The city was expanding and suburbs were being created.

> "Where else, in an area of less than two square miles, could you find an awe-inspiring gorge, on the sides of which grow plants and trees, unknown elsewhere in the world, spanned by Brunel's world-famous suspension bridge, under which flows a river with one of the highest rises and falls of tide in the world? Add to this rolling Downs, some superb examples of Georgian and Victorian architecture, an observatory and camera obscura, a grotto, a renowned public school and one of the world's oldest and most attractive zoos and you begin to get some idea of the richness of Clifton."[2]

This was the stimulating place in which EDE started life, in Pembroke Road (Fig. 5), later moving to Walton-in-Gordano about a mile from Clevedon and within easy reach of a rich geological and ecological environment. He was

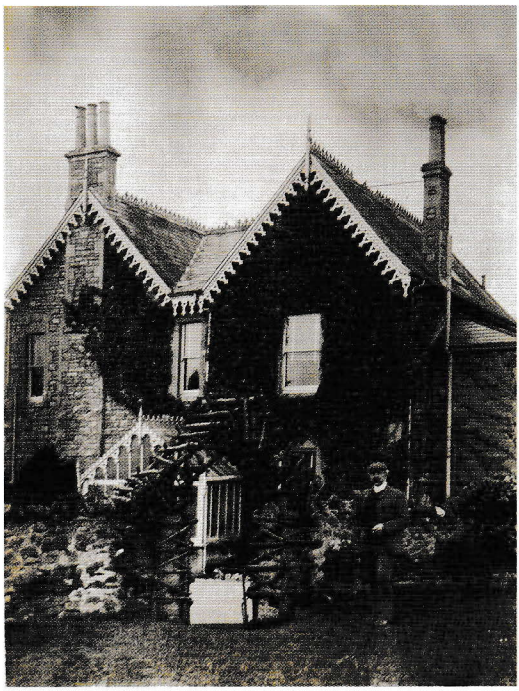

FIG. 5. Gable End Cottage, Clevedon, circa 1910; Evens boyhood home. The figure in the photo may well be James W. Evens – Eric's father. [Courtesy of Bristol Culture]

given a bicycle in the early 1900s and it was on this vehicle that he made excursions into the local countryside. From the sheer amount of material he gathered and photographed he must have spent hours out and about in all weathers; so much so that he became intimate with the topography of the area. This bicycle (Fig. 6) was:

> "bought when he was a boy was so altered and added to for his own convenience, that it is doubtful if any part of the original remained"[3]

Together with his bespoke, home-made cycle cape, and carriers, (it is on display at the M-Shed in Bristol, having been maintained and rebuilt over his life and in use for over sixty years) he was collecting material well into his sixties. In September 1972 a postcard from his cousin L.L. Hiley remarked:

> "Very sorry to hear the gear trouble with your cycle, hope it is not too awkward to mend."[4]

EDE was a meticulous character. The explanations of where material had been gathered, or on photographic negatives, are

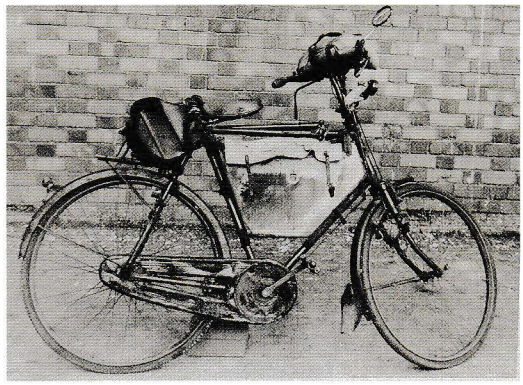

FIG. 6. E. D. Evens' bicycle. [Courtesy of Bristol Culture]

detailed. For example, notes on a quarter plate negative envelope:

> "23/8/11 2.40 pm Pine trees above quarry Holly Lane, Clevedon. Imperial Special rapid F16 1/20 sec. For enlarging to 15 x 18 on Wellington platinum bromide with H2 -O2 give 5 secs. (726)" (Fig. 7).

Many of the slides in the EDE collection have a similar level of detail and it is this that makes them of great importance. This technical expertise at maintenance and attention to detail reflects his home environment as described in the obituary written by family friend H. M. Hatherly for the Quekett Microscopical Club in 1974.

> "There were many facets to his knowledge. He could repair a watch as easily as he attacked rocks on his geological excursions. We all took cover on these occasions as the pieces flew in all directions. I knew his late father before I knew Eric, as I often met him in

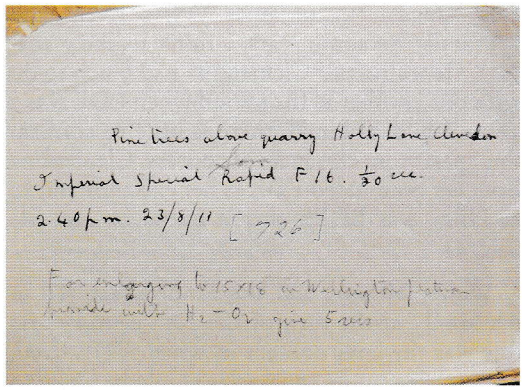

FIG. 7. Annotated negative envelope. [Courtesy of Bristol Culture]

FIG. 8. Grandfather Clock 10/8/12 from the E D Evens archive. [Courtesy of Bristol Culture]

> Masonic circles. He had a fully equipped workshop at their Pembroke Road home where he spent most of his time making 'grandfather' clocks completely. Eric, in a room above, would be mounting all sorts of objects for the microscope: what a pleasure it was to visit them there: always something to be learnt. Mr. Evens senior, in addition to clock-making was, like Eric, very versatile. ... Both the Evens, father and son, were men of the calibre this world can ill afford to lose." (Fig. 8).

He was obviously a talented youth. The earliest of his prints at Bristol Museum and Art Gallery (BMAG) were taken in 1907 when he would have been 14 years old and are a series of Glastonbury Abbey [5] and one of 'Walton Castle from Gable End Cottage, Clevedon' [6]

The earliest slide in the collection is of a Fly's leg made in 1908 when he was 15 (Fig. 9).

In 1915, on a transverse section of Equisetum arvense [7] stained with haematoxylin and eosin and showing mitosis, EDE's slide labels begin to include both collecting and mounting dates, a very helpful feature that he carried on with few exceptions for the rest of his slide making time. His earlier examples have the characteristic quality appearance of his later slides so one is fairly sure that prior to this, throughout his childhood and early teenage years, he would have been honing his microscopical skills (Figs. 10 & 11).

Career

According to biographical notes written by M. K. L. Curtis [8]:

> "[EDE was schooled at] Channel View preparatory School in Clevedon, then went on to Bristol University where he gained an ... Honours degree in Chemistry; after graduation he taught Chemistry at Clifton College."

He then spent some time teaching and during the 1914-1918 war he was exempted from military service. By early 1917 he was collecting specimens in North London and teaching at Finsbury Technical College where he pursued research work on dyes with Professor Morgan FRS. Family friend H.M. Hatherley stated:

> "he acquired a profound knowledge of dye chemistry. The results, when applied to the differential staining of tissues, I have never seen bettered" [9].

On 12th March 1918 EDE was elected a member of the QMC. Living at 8 Christchurch Road Hampstead, NW3 he collected specimens in and around North London from September 1917 through until July 1919. By Easter Monday, 5th April 1920, he was back in Somerset collecting around Bristol. This corresponds with H. M. Hatherley's statement that he returned to Bristol to live with his father in Pembroke Road after his mother died in the early 1920s. This marked a change in EDE's career. The biography prepared by F. S. Wallis, to accompany the catalogue of photographs held at BMAG, describes how he, together, with his father James William Evens, cousin Leonard Lewis Hiley (L. L. Hiley):

> "...acquired a small business in Keynsham grinding ochres and oxides to powder chiefly to be used in the manufacture of linoleum"[10], (Fig 12).

After his father's death in 1927, EDE and L. L. Hiley continued with the business until it closed in the mid-1940's when they would both have been in their early 50's. Their relationship must have been quite close running the business together. In the 1930's his private address was c/o L. L. Hiley, Esq., 65 Clifton Park Road. It

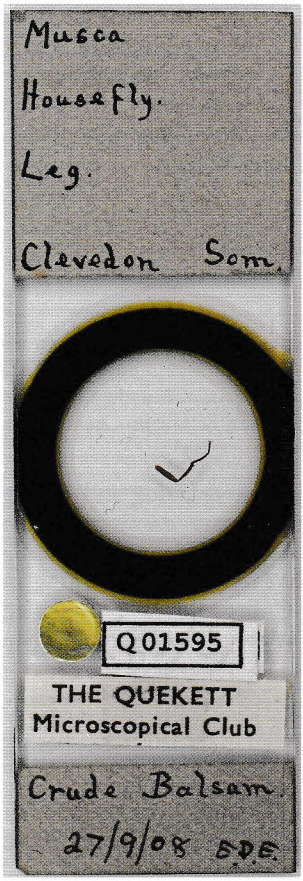

FIG. 9. Leg of Fly mounted in 1908.

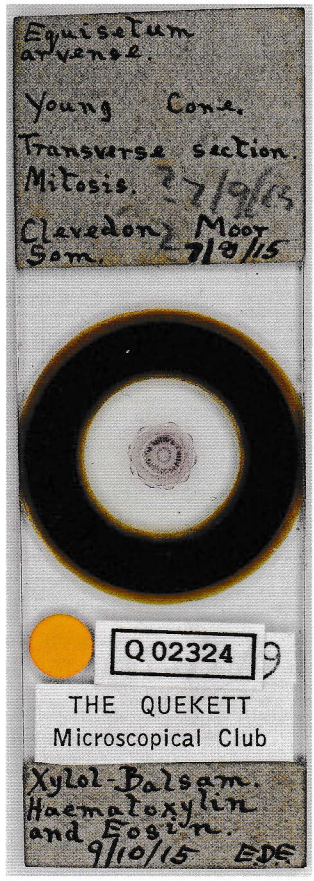

FIG. 10. T.S. Equisetum Cone mounted 9th October 1915.

FIG. 11. Equisetum sporangia and spores mounted 9th December 1965.

was at this time that Wallis and Evens published a paper [11] reflecting his continuing interest in geology. In 1940 living at 31 Cornwall Road Bishopstone [12] he took a photograph of Bristol on fire during an air raid on 24th November 1940. This is the last plate in the BMAG collection. At this time Evens was one of the few members of the now defunct Postal Microscope Club (formed in 1904) [13].

FIG. 12. Colour Mill, Keynsham. [Courtesy of Bristol Culture]

Since his late teenage years he had been pursuing an investigation into the geology of Conygar Quarry, near Clevedon, Somerset. Some of the products of this investigation were used in the 2012 paper by Falcon-Lang, describing Locality 9 as follows:

> "This site was investigated over a 27 year period, from 1912 to 1939, by Mr. Eric D. Evens (1893–1971 [3]), a keen amateur geologist, microscopist and photographer..... His collecting site comprised a very large active quarry near Clevedon, Somerset (51°26'45.74"N; 2°50'04.32"W), which had commenced operation prior to 1885 and was only

finally abandoned in the late 1950s. The long period of collecting (from 1912 to 1939) likely reflects intermittent discoveries as the active quarry face retreated. Evens produced his own thin sections of the Conygar Quarry material and passed them onto Robert Crookall at the British Geological Survey, where they are accessioned. Some unsectioned material is accessioned at the Bristol City Museum and Art Gallery. The stratigraphic placement of this section at the western edge of the Bristol Coalfield is uncertain, and these rocks are assigned to the undivided Pennant Sandstone Formation, which is of late Bolsovian–earliest Asturian age in this area"[14].

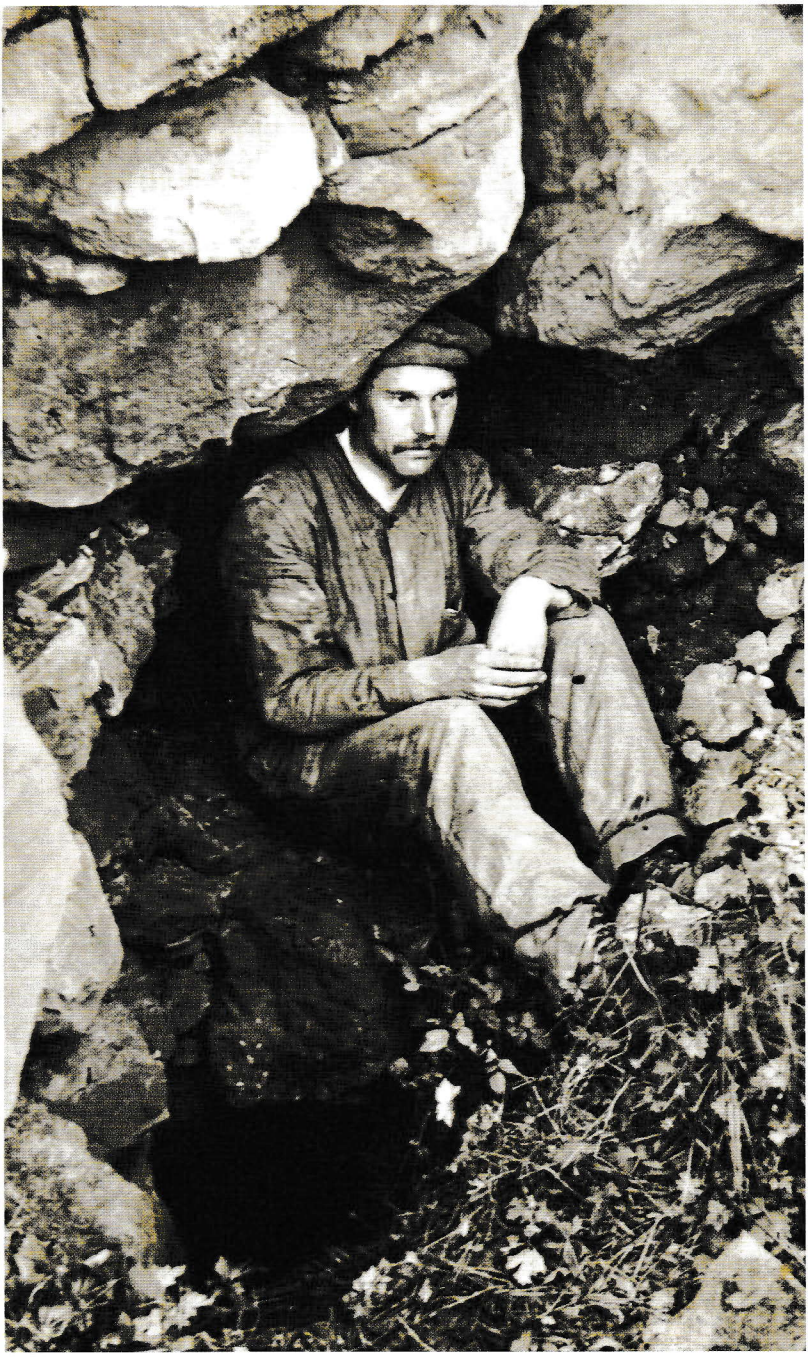

FIG. 13. Postcard annotated EDE, Date uncertain. [Courtesy of Bristol Culture]

In 1945, now living at 4 Hurle Road, Clifton [15], he donated rock fragments from Cornwall to BMAG, these may have been associated with his work on stone tools in South-West England for the South-Western Federation of Museums and Art Galleries (Fig. 13).

In the mid-1940's EDE obtained a post at the Merchant Venturers' Technical College at Ashley Down where he remained until he retired. He moved house several times in the 1940's and 1950's but remained in the west of Bristol close to his childhood homes. In July 1949 when he joined the Postal Microscopical Society he was living at Revelstock, Bishopsworth, near Bristol. By 1952 he had moved to 116 Gloucester Road, Bishopstone, Bristol 8, c/o Mrs Thorne and then during his sixtieth year in 1953, to Redland, at 96, Hampton Road where he remained until at least 1958. There was then a period when his address was at Downfield Lodge, Princes Road, Clevedon, a building which has a long history as a nursing and convalescent home. Finally on 6th November 1973, when he died from heart failure, his address was given as 36 Longmead Avenue, Bishopstone, Bristol.

For 11 years after retirement he was employed in an honorary position at the Agricultural and Horticultural Research Station, Long Ashton, working under Dr D. Woodcock on problems of organic chemistry and jointly publishing papers in 1963 and 1970.

He was a member of the sub-committee of the South-Western Federation of Museums and Art Galleries working on the petrological identification of stone axes in South-Western England, along with F. S. Wallis, publishing reports on this in 1962 and 1972. Wallis was the Petrologist and Evens was listed as Assistant Petrologist. Dr F. S. Wallis was the Director of the City of Bristol Museum from 1945 to 1960 and one of EDE's closest friends and through him BMAG received the Evens collection they have today.

His photographs have had a life of their own even after his death. In 1981, D.J. Irwin wrote an article [16] in '*The Belfry*', Bulletin of the Bristol Explorers Club, entitled "Early Cave Photographers and their work". He referred to the widely known publications by H. D. Balch in the nineteen thirties, which had used EDE's photographs in places.

> "Mendip has been particularly fortunate in having had to hand a number of outstanding cave photographers, two of whom must be recorded. I will mention the work of Balch himself but, though there are a few examples of his work still about, the work of Savory and Evens is significant. Savory will be a name known to all cavers but Evens will probably be new to most, even though some examples of his work appeared in Balch's books. Unfortunate duplication of photographs with those taken by Savory slightly dimmed Evens standing in the caver's memory."

Balch thus acknowledged that EDE's photographs would have had greater importance in the absence of J. H. Savory's better known ones. In this article he does shed light on the technical difficulties these photographers would have encountered:

> "Some of the work ... is nothing short of miraculous when it is remembered that the cumbersome equipment then used must have caused great problems of transport through the smaller cave passages, and when one considers the patience required in waiting for the smoke to clear after using flash-powder lighting techniques. Though their work is not consistently good, there are many photographs that rival the best that the modern cave photographer produces." (Fig. 14).

Why would these images be important? Well they meticulously recorded the general views and some details of caves and in the case of the Mendips, all known formations and passages of Swildons Hole in 1925, shortly after they had been discovered and so they constitute a primary reference work that can never be duplicated. In 1985 the photographs were used on at least two occasions as records of long changed landscapes.

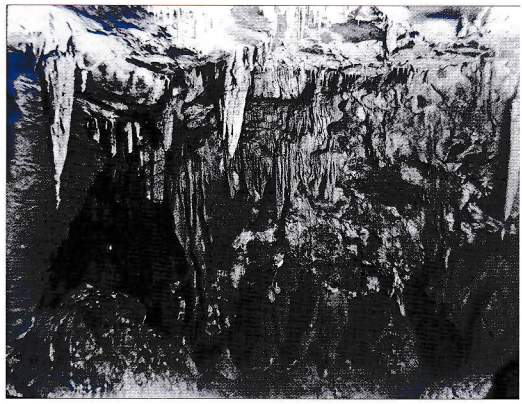

FIG. 14. Postcard annotated EDE, Date uncertain. [Courtesy of Bristol Culture]

In May a report was prepared for the Countryside Commission to provide a "useful indication of the landscape and vegetation of [Burrington Combe and Black Down] in the 1920's and 1930's" [17]. Then in August, a Durham undergraduate working on a dissertation "Changing scrub distributions on selected areas of the Mendips since the 1930's" found the photographs of Dolebury Warren and Cheddar Gorge gave much finer detail of scrub than the old aerial photographs [18].

There was an exhibition in Pensford, "The Chew Valley, 1920–31, Photographs by E. D. Evens (1893–1973)" organised by The Beckett Centre, Pensford, with support from BMAG in May 1989. The catalogue notes say:

> "All of Evens' plates... are meticulously documented. This detail certainly adds to the historical value of the pictures, many of which show scenes which are now dramatically altered.

For example the fine view from Ubley Hill (no. 21) [P8455] covers the site now occupied by Chew Valley Lake, and the view from Providence (No. 4) [P8106] includes areas now submerged by Bristol suburbs. The pleasing images of pre-war agriculture are reflected in hay-stacks, flowery pastures, corn stooks, thick hedges and hundreds of splendid elms."[19], (Fig 15).

Once again the photographic collection has represented a primary source for understanding the changes that have occurred in this part of Somerset in the 20th century.

It is not just the photographs that have been used by other scholars since EDE's demise. His publications and slides are still important sources of information. In 1997, P. A. Brown [20], in 'The Biology Curator', referred to EDE's own publication, from 1961, on Glycerine Mounting Media [21] which is a classic reference document. The most recent citation I have found for EDE's work is in the 2012 paper by Falcon-Lang [22] in which 11 photographs of slides of minerals collected and prepared by EDE are used. The tabulated data includes references to specimens from the Conygar Quarry found and identified by EDE and there is a paragraph (reproduced above) relating to the 27 years during which he collected from this site. The paper is an extensive analysis of museum specimens of permineralised plant assemblages from the Pennant Sandstone in southern England. The non-coal-forming specimens collected by EDE contribute to propositions about the seasonality and geography of this area during the Carboniferous period.

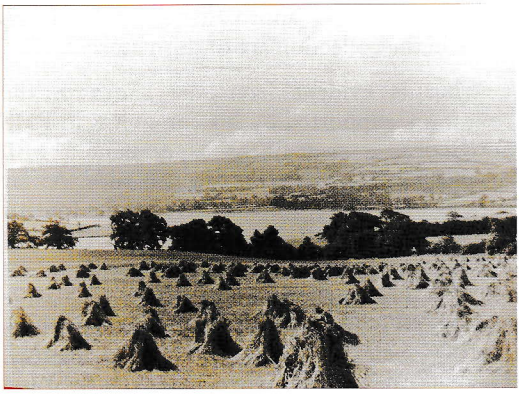

FIG. 15. Chew Valley from Ubley showing the Blagdon Reservoir 3/9/1924. [Courtesy of Bristol Culture]

Bequests

His will, made in 1971 when he had recently moved from Downfield Lodge, Princes Road, Clevedon BS21 7SZ, reveals a little more about EDE. Downfield Lodge has, in its past been a Nursing Home and one wonders if EDE had been unwell, maybe with the heart trouble that featured on his Death Certificate a year or two later, and needed medical care for a period. From the end of 1971 the frequency with which he collected material or mounted specimens is significantly lower than in the previous few years when he had been busy in most months of the year. Slide mounting was restricted to January, February and March in 1972 and only October in 1973, the last noted collection being 19th July 1971. Was he 'out of action' with a health problem? However he was still riding his bicycle in 1972.

In the will the first bequest is of his body to Bristol University. This goes well with the minimalist work area he described in a PMS notebook, his reluctance to share a photograph of himself in Stanley Patrick's 1953(?) Notebook 'Introducing Mr...' and with the discussion in the PMS notebooks about the importance of the picture or the frame in relation to microscope slides. He decried elaborate ringing being very much of the opinion that the only purpose of a slide is to provide a good image of the object,

and it is the object that has most importance. This was a man of simple tastes.

The eleventh bequest of 'The sliding Leitz microtome' was to 'any cancer research laboratory my executors may choose'. Why to a cancer research laboratory? EDE died from heart failure, with no mention of cancer on the certificate. It occurred to me that in the early 20th century he briskly returned from London to Bristol about the time his mother died. In the family albums are pictures taken earlier in the century and one of the ladies in them is obviously significantly unwell. Plus the family visited a health spa at Schinznach in Switzerland in 1906. I conjecture that his mother may have suffered with and died from cancer. I cannot confirm this as I have not located Ada Evens' death certificate yet; I do wonder if she died in another country – maybe at another health spa. I think this man was very much attached to his mother and maybe carried regret through his life at her early death.

The Quekett Microscopical Club was the beneficiary not only of three glass fronted cases containing microscope slides, but also the accompanying notes and some associated geological specimens. I know the whereabouts of the slides and cases, but have yet to find the notebooks or specimens. The Proceedings of the QMC in 1974 only make reference to the slide collection; there is no mention of the notes. Surely they would not have accepted one without the other?

Evens Bibliography

Throughout his adult life EDE published in many areas and on a variety of topics. The list I have so far accumulated is provided in Appendix 1. It does not include correspondence or articles in other journals such as *The English Mechanic* – to which he subscribed (bequeathing Bound and Unbound volumes to a Mr E. A. Fribbens of Long Aston Research Station), and to which he referred in the PMS notebooks – or *The Microscopist* – edited by his acquaintance Dr. D. S. Spence, with whom he had many exchanges through the medium of the PMS notebooks. This was a well-read gentleman and there are references in the PMS notebooks to active correspondence with members, mainly about topics microscopical. It is, therefore, reasonable to consider that he would also have had active correspondence with peers about petrology and of course his professional interests in dye and pesticide chemistry. None of this has thus far come to light.

E D Evens Slides

Within the scope of this biographical article, only a taste of EDE's slide mounts can be given.

In 1919, as an active participant of the Club, EDE donated six slides [3] to the QMC; these were recorded in the Proceedings [4] for that year and more were added during the rest of his membership of the Club (from 1918 to about 1940). There are about 150 slides from this period still in the collection. When Evens died he bequeathed to the QMC three glass fronted slide cabinets, full mainly of his own slides [5]. These cabinets and contents form the basis of the Quekett's E. D. Evens Slide collection of over 2400 slides made by him, embracing zoology, botany and petrology. These slides are well annotated, most with date and place of collection, mounting medium formula and date of mounting and from this we can determine much of his modus operandi, and together with retrospective notes in the PMS notebooks get an understanding of his motivations.

Since boyhood he had roamed the fertile collecting grounds near his Bristol home, often on a bespoke bicycle [7], amassing a great deal of material of all kinds which he eventually mounted on slides. It is the tangible evidence of the slides that brought him to my attention. There are not only many of them in the QMC collection but generally they are in remarkably good condition. This is no surprise for balsam mounts, but much more of an achievement for fluid mounts and approximately half of the slides in the collection are of this nature.

What is evident from the slides in the collection, supported by his comments in PMS notebooks, is that Evens experimented with specific formulae to achieve given ends. As far back as 1921 he published articles in the Journal of the Quekett Microscopical Club (JQMC) relating to correct construction of fluid mount cells [8]. His underpinning thesis was that the cell should be firmly attached to the substrate, and the cover slip seal should be impermeable. This could be achieved with a lining of petroleum jelly and very careful exclusion of air from the cell, followed by numerous coats of lacquer.

This process took many weeks to complete. If the object was being taken through finely graded steps of increasing osmotic pressure then it could take the craftsman years to complete the process.

His acute scientific curiosity and attention to detail in the composition of media, is evident in the paper "*Note on Glycerine as a Mounting Medium*" by Evens and read by the Hon. Sec. at the QMC meeting on 14th April 1922 [9], in which he described experiments on the alleged solvent action of Glycerine on calcareous structures, and his finding of no demonstrable action. From this he:

> *"thought the matter worthy of further investigation on account of the value of Glycerine as a mounting medium"*

This problem, dissolution of calcareous structures, is one that concerns anyone wishing to mount creatures with soft bodies and calcareous support e.g. Pluteus larvae of sea urchins and the like. The mountant needs to be sufficiently flexible to present the soft structures without distortion, but alkaline enough to avoid dissolving the skeleton. In a 1952 PMS notebook he included a slide of these creatures and his extensive notes relate his concerns:

> *"When alive there is a beautiful and very delicate framework of calcareous rods supporting the body and running down to the tip of each arm. Unfortunately this has dissolved in the mounting medium and vanished. I have been trying some experiments since mounting this slide and find that in order to prevent calcium carbonate from dissolving, it is necessary to have the medium well on the alkaline side of neutral. It dissolves slowly at pH=8 & fairly rapidly at 7. In order to be safe the medium should have a pH of at least 8.5 or perhaps 9 even. If I get any more of these I shall have to have another try."*

There was a lively discussion with David Spence, though the medium of these notebooks [10], regarding the advisability of storing formalin or glycerine mixtures with a few calcite crystals, or precipitated chalk for jellies to keep a high pH. They considered whether continual absorption of carbon dioxide from the air into the medium was complicit in this dissolution. Evens' resolution for glycerine jelly, which is generally strongly acidic, was to shake the medium with magnesium carbonate powder, or magnesium oxide to control the pH of the medium, filter it and use at once. Spence thought:

> *"the amount of carbon dioxide leaking into a properly sealed mount would be almost none. Could not Mr. Evens devise an experiment to investigate the point? I think I mentioned in "The Microscope" that shellac had been found a bar to atmospheric corrosion."*

Spence then declared:

> *"The astrophysicist H. Bondi says in his book "Cosmology", "It is clear that there is room for wide divergencies of opinion. This in itself is no disadvantage, since serious progress is impossible in a state of self-satisfied unanimity".*

And the discussion turned to the making and adequate sealing of cells about which Evens had published papers in the JQMC in 1921, and indeed published more on the topic in 196 [11].

On the preservation of colours, in 1951[12] he said:

> *"The green plants were fixed in 2½ – 4% neutral formalin + ½ – ¾ % uranium acetate after 18 hours. The zinc replaces the magnesium in the chlorophyll giving a much more stable compound while the uranium seems to improve fixation. After 1–2 days I give them a wash for an hour and then grade them up to 10% solutions of the mounting medium by 1¼ % steps every 2–4 hours with the addition of about 1% of neutral formalin to prevent the growth of mould, etc.*
>
> *Omit the formalin & use a crystal of thymol instead*
>
> *They are then tipped into an open dish a watchglass & allowed to concentrate, usually in a cardboard box to keep out dust & light. I allow it to take 1–2 months over the evaporation & finally mount in the pure medium.*
>
> *The mounting material is really a rationalised Deane's Medium which was composed of gelatine & honey. It had several disadvantages – it was strongly acid & often very dark & was difficult to use as it "skinned over" owing to evaporation. & was of uncertain composition. So I made up this mixture starting with pure cane sugar as a solution of known strength and inverting it with weak acid to an artificial honey & then neutralising with chalk. In this way I got a mixture of dextrose and fructose of known composition. The final mixture is so adjusted that it just does not crystallise and also, on the average, it does not tend to dry up nor abstract water from the air. This latter is what the glycerine is for. I usually use it in the form of a jelly by adding about 2% of gelatine. The addition of zinc acetate is to help the preservation of the green colour but I think it is not necessary in the final mount [13]*
>
> *It sometimes seems to produce a few very small rosettes of crystals, so now I am omitting it.*
>
> *Better keep it out. It often makes the jelly darken*

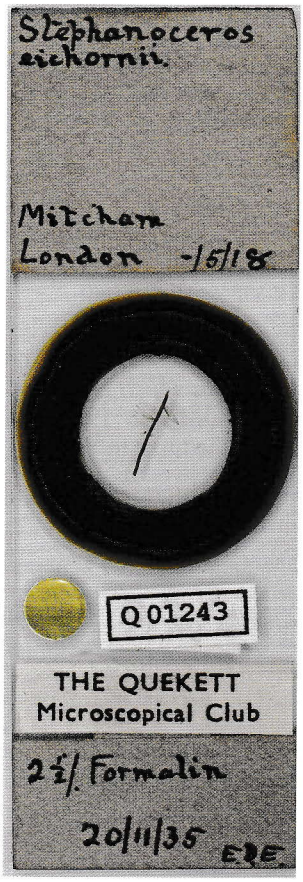

FIG.16. *Stephanoceros*mounted in 1935 using 2.5% formalin.

FIG. 17. *Stephanoceros* from a collection in 1918 but mounted in 1971 in Evens' preferred mounting medium.

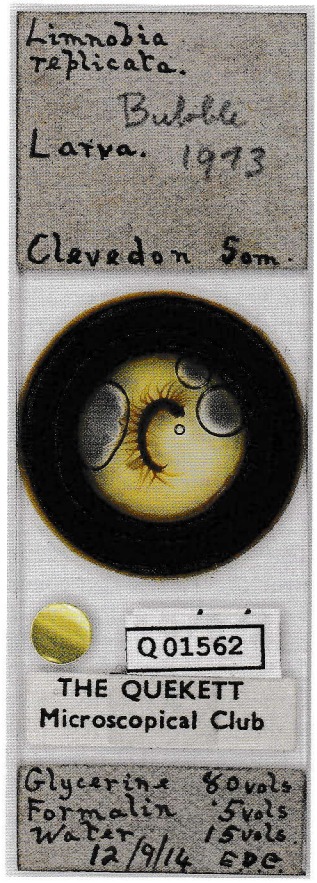

FIG. 18. *Limnobia* mounted in 1914 in 80% glycerine with 5% formalin.

> *Old Deane's medium by itself was very good for preserving colours of all sorts – much better than glycerine jelly which superseded it"*

The annotations in boxes were added later in 1960 [14] when he recirculated the relevant pages showing that he was always striving to improve his mounting media. Many of his mounts do show excellent preservation of colour – like the Vaucheria spores above – and not always with complex mountants.

With brown diatoms [15]:

> *"the brown pigments always turn green & I wish I knew how to preserve them. I believe the browns are carotene pigments & so it may be that they fade by oxidation but even using air free (boiled) water & mounting at once does not keep them"*

And he wondered:

> *"It may be that in diatoms, peridinians, etc. the carotene is also conjugated with a protein & that this compound is broken up when the protein is denatured by the fixing agent. I don't know."*

There is a classic medium: glycerine 60%, gelatine 2%, formalin 5% (the basis for many of his later mounts), the formalin being added at the last minute to denature the gelatine and so stiffen the medium and reduce mobility of the mounted specimen. In the collection the earliest example mounted in this variation of medium is Stephanoceros mounted in 1935 (Fig. 16); he was using exactly the same medium in 1971, some 36 years later, for the same subject (Fig. 17). He did however experiment all the time,

FIG. 19. Dragonfly mounted in 1915, using 40% glycerine with 5% formalin.

FIG. 20. The fish louse *Argulus* mounted in 1931 using 60% glycerine and 2% gelatine.

here are some of the variations he used during his earlier life.

In 1914 he used 80% glycerine with 5% formalin on an insect (*Limnobia*) this slide is now showing several large bubbles, but the specimen seems reasonably well preserved (Figure 18) whilst in 1915, 40% glycerine with 5% formalin for a Dragonfly (Fig. 19). He mounted a Fish Louse (*Argulus*) in 60% glycerine and 2% gelatine in 1931 (Fig. 20).

Evens's slide labels are distinctive being plain paper of a light blue-green hue. Older ones are darker. Among the collection there are some slides with indeterminate dates, for example the Lophopus is labelled 'May 1916', or others with alternative sources like the *Stephanoceros* 'Mitcham or Hampstead, London', this is contrary to his precise records on many of the other slides. These tend to have a fresher looking label, which suggests to me that he curated his slides, repairing and remounting as necessary, which is in keeping with his obviously meticulous practical skills. This is supported by notes in PMS books revealing that he took the trouble to remount as required.

> *"[Lophopus] is an old mount in dilute formalin & will not last much longer. The water is evaporating through the cement & the cover is concave. It should have been mounted in 55% glycerine which does not evaporate & if it comes back safely I may remount it."[22]*

This may refer to QMC Slide number Q01181 which was collected in May 1916 but mounted in 1971; this slide may have been the remount.

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